

# STORMWATER MANAGEMENT PLAN

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CITY OF  
**CARTERVILLE, MISSOURI**  
MOR04C002



OCTOBER 2021 - SEPTEMBER 2026  
PERMIT CYCLE

Revised 01/07/2024

PREPARED BY:  
ALLGEIER, MARTIN AND ASSOCIATES, INC.

STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION



## MISSOURI STATE OPERATING PERMIT

### General Operating Permit

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No: MOR04C002

Owner: City of Carterville  
Address: 1200 E 1st St  
CARTERVILLE, MO 64835

Continuing Authority: City of Carterville  
1200 East First Street  
CARTERVILLE, MO 64835

Facility Name: Carterville Phase II MS4  
Facility Address: 1200 E 1st St  
CARTERVILLE, MO 64835

Legal Description: Sec. 16, T28N, R32W, Jasper County  
UTM Coordinates: 373474.338/4111493.872  
Receiving Stream: Tributary to Center Cr. (U)  
First Classified Stream - ID#: 100K Extent-Remaining Streams (C) 3960.00  
USGS# and Sub Watershed#: 11070207 - 0607

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein.

**FACILITY DESCRIPTION** All Outfalls SIC #9511  
All Outfalls - Stormwater discharges from Regulated Phase II Municipal Separate Storm Sewer Systems.  
Comprehensive permit

SIC 9511/NAICS 924110

This permit authorizes only wastewater, including storm water, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System, it does not apply to other regulated areas. This permit may be appealed in accordance with RSMo Section 644.051.6 and 621.250, 10 CSR 20-6.020, and 10 CSR 20-1.020.

October 01, 2021

Issue Date

Edward B. Galbraith, Director  
Division of Environmental Quality

September 30, 2026

Expiration Date

Cynthia S. Davies, Regional Director  
Southwest Regional Office

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**PART 1. PERMIT COVERAGE AND APPLICABILITY**

This permit is for coverage under this Comprehensive General Permit for Phase II MS4s

**1.1.A** Permit Area: This Missouri State Operating Permit (permit) covers all areas served by a Municipal Separate Storm Sewer System (MS4) for which the applicant is identified as the Continuing Authority. The Permit Area may change based upon areas incorporated into or removed from the permittee’s jurisdictional area during the term of this permit, or expansion of the Urbanized Area. Areas added shall be covered under this permit and noted in the Stormwater Management Plan.

**1.1.B** Applicability: This permit authorizes discharges of stormwater from regulated MS4s, as defined in 10 CSR 20-6.200(D)24. This permit also authorizes the discharge of stormwater commingled with flows contributed by process wastewater, non-process wastewater, or stormwater associated with industrial activity provided such discharges are authorized under separate National Pollutant Discharge Elimination System (NPDES) permits or no exposure certification as defined in 10 CSR 20-6.200(C).

The permittee, or co-permittee, is authorized to discharge under the terms and conditions of this general permit if the permittee:

1. Owns or operates a regulated Small MS4 as defined in 10 CSR 20-6.200 (D)16;
2. Also is located in the Urbanized Area (UA) as defined by the most recent U.S. Census for which the applicant is identified as the Continuing Authority with a population of at least 1,000;
3. OR inside the municipal corporate limits of a jurisdiction with a population of at least ten thousand (10,000) and a population density of one thousand (1,000) people per square mile or greater;
4. OR is inside the service area of a publicly owned separate storm sewer system designated by the Department if it is determined that its discharges from the MS4 have caused, or have the potential to cause, an adverse impact on water quality.

**1.1.C** Categories of Regulated Small MS4s under this comprehensive permit. This comprehensive permit categorizes MS4s by the following categories, or Groups, based on the population served as determined by the most the recent Decennial Census at the time of permit issuance, the type of Regulated MS4, and the co-permittee situation.

Group A	Group B	Group C
Traditional Small MS4s (cities) that serve a population of less than 10,000 within a UA; OR	Traditional Small MS4s that serve a population of at least 10,000 but less than 40,000; OR	Traditional Small MS4s that serve a population of 40,001 or more; OR
Class 2 counties; Non-traditional such as Universities, Federal facilities.	Class 1 counties	Co-permit Small MS4s

This is the Comprehensive General Permit to cover Group A, B, and C MS4s.

The population of a Small MS4 may change during the permit term. However, the Group designation of a regulated MS4 will not change during the permit term based on population fluctuation.

1. The Group designation of a regulated MS4 is based on the most recent Decennial Census at the time of permit issuance. Results of the national Census held during a permit term will not affect the Group of an MS4 until the next permit renewal unless the permittee joins another MS4 as co-permittee.
2. For the purpose of this section “serve a population” means the residential population within the regulated portion of the Small MS4 based on the most recent Decennial Census.

**1.1.D** Authorized discharges: The following are types of discharges authorized by this permit:

1. *Stormwater discharges.* This permit authorizes stormwater discharges to waters of the state from the regulated MS4 identified in Section 2.1.A except as excluded in Section 2.1.F of this permit.
2. *Non-Stormwater discharges.* The permittee is authorized to discharge the following non-stormwater sources provided the permitting authority has not determined these sources to be substantial contributors of pollutants to the permittee’s MS4:

- Water line flushing;
- Landscape irrigation and lawn watering;
- Diverted stream flows;
- Rising ground waters and springs;
- Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(b)(20));
- Discharges from potable water sources;
- Foundation or footing drains;



- Air conditioning condensation;
- Irrigation water;
- Water from crawl space pumps;
- Individual residential car washing;
- Flows from riparian habitat and wetlands;
- Street and sidewalk wash water, water used to control dust, that does not use detergents;
- Dechlorinated and uncontaminated residential swimming pool discharges; and
- Discharges or flows from emergency firefighting activities. Fire-fighting activities do not include washing of trucks, run-off water from training activities, and similar activities.

**1.1.E** In the event the regulated MS4 has an oil water separator which is used to exclusively treat stormwater; this permit authorizes the operation of oil water separators solely for the treatment of stormwater. The oil water separators must be appropriately operated and sized per manufacturer's or engineering specifications. The specifications and operating records must be made accessible to Department staff upon request. Oil water separator sludge is considered used oil; sludge must be disposed of in accordance with 10 CSR 25-11.279.

## **PART 2. PERMIT RESTRICTIONS AND EXEMPTIONS**

**2.1.A** Limitations on coverage: The permittee, shall prohibit non-stormwater discharges and stormwater discharges that combine with sources of non-stormwater into the MS4, except where:

1. Non-stormwater discharges are in compliance with a separate NPDES permit; and
2. Authorized by Section 1.1.D of this permit.

**2.1.B** This operating permit does not affect, remove, or replace any requirement of the Endangered Species Act; the National Historic Preservation Act; the Comprehensive Environmental Response, Compensation and Liability Act; or the Resource Conservation and Recovery Act. Determination of applicability to the above mentioned acts is the responsibility of the permittee. Additionally, this permit does not establish terms and conditions for runoff resulting from silvicultural activities listed in Section 402(1)(3)(a) of the Clean Water Act.

**2.1.C** Discharge Limitations

1. The permittee shall implement Best Management Practices (BMPs) via an iterative process to reduce the discharge of pollutants to the Maximum Extent Practicable (MEP) into the MS4 for the goal of attainment with Missouri's Water Quality Standards.
2. The permittee shall implement and enforce a Stormwater Management Program per the requirements listed in this operating permit in accordance with section 402(p)(3)(B)(iii) of the CWA, corresponding NPDES regulations, 40 CFR 122.34, 40 CFR 122.28(d)(2), and in accordance with the Missouri Clean Water Law (MCWL) and its implementing regulations under 10 CSR 20-6.200.
3. The permittee shall comply with all provisions and requirements contained in this permit and with their individual Stormwater Management Program including plans, ordinances, and schedules developed in fulfillment of this permit.
4. If the Department determines a regulated MS4 is causing or contributing to instream excursions of Missouri's Water Quality Standards, then the Department may require corrective action(s) or require an application for a site-specific permit to ensure that BMPs are being implemented via an iterative process to reduce pollutants to the MEP.
5. Newly designated regulated MS4s applying for coverage under this general permit and discharging to waterbodies or watersheds subject to an existing EPA approved or established TMDL may be denied coverage under this general permit and required to apply for and obtain a site-specific operating permit for stormwater discharges from their regulated MS4.

## **2.2 Authorization to Discharge and Application Requirements**

**2.2.A** Authorization to discharge stormwater from a regulated MS4 requires each permittee (existing and recently designated regulated MS4s) to submit a complete application for the MS4 general permit. The permittee shall submit their application on the latest version of the application form(s); either Form K, or Form L and Form M.

**2.2.B** The application shall be signed and dated by an authorized signatory.

1. All permit applications shall be signed and certified in accordance with 40 CFR 122.22 and 10 CSR 20-6.010(2) by either a principal executive officer or by an individual having overall responsibility for environmental matters for the permittee.
2. All reports required by this permit, and other information requested by the Department shall be signed by a person described in Section 2.2.B.1 of this permit, or by a duly authorized representative of that person. A person is a

duly authorized representative only if the authorization is made in writing by a person designated in Section 2.2.B.1 of this permit.

- 2.2.C** Existing regulated permittees seeking renewal of their MS4 permit shall submit a renewal application within 180 days prior to the expiration date of this operating permit unless the permittee has been notified by the Department that an earlier application is required in accordance with 10 CSR 20-6.200 (1)(D)24.B.
- 2.2.D** Newly designated regulated MS4s shall submit their permit application within 180 days following notification by the Department that permit coverage is required.

### **PART 3. STORMWATER MANAGEMENT PROGRAM AND PLAN**

#### **3.1 Stormwater Management Program**

- 3.1.A** To the extent allowable under state and local law, a Stormwater Management Program must be developed, implemented, and enforced according to the requirements of this general permit. This permit includes specific terms and conditions, which are the requirements needed to meet the MS4 regulatory requirements.
1. **Existing permittees** shall assess program elements that were described in the previous permit, modify as necessary, and/or implement new elements, as necessary.
  2. **Newly regulated permittees** shall have the program fully implemented within 5 years of issuance of their permit.
- 3.1.B** As part of the Stormwater Management Program, the permittee shall update or develop a document, with appropriate appendices and supplemental attachments explaining the Stormwater Management Program. Permittees shall create and maintain this written Stormwater Management Plan (SWMP) describing schedules, procedures, contacts or other items listed under Part 4 of this permit. This document may be electronic.
1. The SWMP shall be maintained by the MS4 Operator to ensure consistency with the implementation, continuity of the Stormwater Management Program, and iterative reviews of programmatic BMPs and procedures.
  2. The SWMP does not go through Department approval and is not incorporated into this permit.
  3. The SWMP shall be updated or developed within 90 days after the renewal of the permit.
- 3.1.C** The MS4 Operator may add supplemental items to the SWMP. These items include but are not limited to:
- Maps;
  - Standard operating procedures (SOPs);
  - Inspection forms;
  - Sample data;
  - Operations and Maintenance Manual;
  - Website or social media account tracking;
  - Stream Team Activity Reports;
  - Tracking and evaluation documents; and
  - Documentation of agreements for co-permittees and/or cooperative agreements.
- 3.1.D** Permittees shall implement programmatic BMPs consistent with the provisions of this permit to achieve compliance with the standard of reducing pollutants to the maximum extent practicable per 40 CFR 122.34.
- 3.1.E** The MS4 Operator may replace or modify ineffective BMPs with effective BMPs. If the name of a MS4 contact changes, that may be updated on the next Stormwater Management Program Report and/or via email to the Department at [MS4@dnr.mo.gov](mailto:MS4@dnr.mo.gov).

#### **3.2 Sharing Responsibility**

- 3.2.A** Co-permittees agreements.
1. Implementation of one or more of the minimum control measures may be shared with another governmental entity or the governmental entity can assume responsibility for the measure via the co-permittee option if:
    - a) The co-permittee has a MS4 located within or partially within an Urbanized Area (UA) as determined by the most recent Bureau of Census, which can include, but is not limited, to: municipalities, county, military bases, large hospitals, prison complexes, universities, sewer districts, and highway departments;
    - b) The co-permittee, in fact, implements the control measure(s);
    - c) The specific control measure, or component of a control measure, is at least as stringent as the corresponding permit requirements;
    - d) The co-permittee agrees to implement the control measure on the other permittee's behalf; and
    - e) Written acceptance of this obligation is required.
  2. This co-permittee obligation and written acceptance, shall be described and maintained as part of the SWMP.

3. If the co-permittee agrees to report on the control measure, the co-permittee shall cooperate with the reporting requirements contained in Section 5.3 of this permit.
4. If one co-permittee fails to implement the control measures, then that co-permittee shall remain liable for any discharges due to that failure to implement. Additionally, the Department may require corrective actions(s), require an application for a site-specific permit, or require the co-permittee to apply and obtain their own Phase II MS4 general permit.

**3.2.B** Other agency agreements. Implementation of one or more of the minimum control measures or BMPs may be contracted out to another entity or organization, such as a non-profit organization or watershed organization. The MS4 Operator may grant responsibility for the MCM or BMP. The agreement must be described in the SWMP detailing which BMPs are being assumed by the other entity or organization. Written agreements between another entity or organization stipulating arrangements and responsibilities for meeting permit requirements shall be made available to the Department upon request. The permittee is responsible for oversight to ensure compliance with this permit.

### **3.3 Reviewing and Updating the Stormwater Management Program**

**3.3.A** The MS4 Operator shall conduct an annual review of their Stormwater Management Program. This is recommended to be in conjunction with preparation of the MS4 Stormwater Management Program Report required under Section 5.

**3.3.B** Changes to the Stormwater Management Program requested by the Department must be made in writing, set forth a time schedule for the permittee to develop the changes, and offer the permittee opportunities to propose alternative program changes to meet the objective of the requested modification. All changes required by the Department will be made in accordance with 10 CSR 20-6.200. The Department may require changes to the Stormwater Management Program as needed to:

1. Address impacts on receiving water quality caused or affected by discharges from the MS4.
2. Include more stringent requirements necessary to comply with new federal or state statutory or regulatory requirements; or
3. Include such other conditions deemed necessary by the Department to comply with the goals and requirements of the MCWL and the federal Clean Water Act (CWA).

**3.3.C** In the event of a transfer of ownership, change in Continuing Authority, or change in responsibility for Stormwater Management Program implementation; the permittee shall implement the Stormwater Management Program on all new areas added to the permittee's portion of the MS4 (or for which the permittee becomes responsible for implementations of stormwater quality controls) as expeditiously as practicable, but not later than one (1) year from the addition of the new areas.

## **PART 4. MINIMUM CONTROL MEASURES**

Entities seeking coverage under this general permit shall develop and implement a Stormwater Program that includes the following six (6) Minimum Control Measures (MCMs).

1. All six MCMs apply to all traditional MS4s (cities and counties) regulated under this permit.
2. For non-traditional MS4s (universities, hospital complexes, prisons, and federal facilities) or MS4s in a co-permit that do not have responsibility over all MCMs. The permittee shall document in the SWMP and on each MS4 Stormwater Management Program Report which MCMs are not applicable. Contact the Department for any questions regarding applicability of MCMs.

### **4.1 MCM 1. Public Education and Outreach on Stormwater Impacts**

The MS4 Operator shall implement a public education program to distribute educational materials to the community and/or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff.

The public education and outreach program shall, at a minimum include the following:

- 4.1.A** The MS4 Operator shall target specific audiences who are likely to have significant stormwater impacts.
1. Traditional MS4s (cities and counties) shall address the residents being served by the MS4;
  2. Non-traditional MS4s shall address the community served by the MS4 as listed below:
    - a) Universities shall target the faculty, other staff, and students;
    - b) Military bases shall target military personnel (and dependents), and employees (including contractors).
    - c) Prison complexes or other multi-building complexes shall target staff and applicable contractors.
  3. Additional audiences within the MS4 service area (such as, but not limited to, those listed in **Table I**) shall be addressed as listed below:

- Group A: No requirement for additional audiences**
- Group B: A minimum of one (1) additional audiences**
- Group C: A minimum of two (2) additional audiences**

The target audiences may remain the same for the entire permit cycle or may change if the tracking and adaptive management reviews show a new target may be better for the MS4. Any changes shall be stated and explained in the MS4 Stormwater Management Program Report.

**Table I -Target Audiences**

- Schools, educational organizations, or youth service and youth groups;
- Businesses, including commercial facilities, home-base and mobile businesses;
- Institutions or formal organizations such as churches, hospitals, service organizations;
- Developers or construction site operators;
- Homeowner or neighborhood associations;
- Industrial facilities;
- Local government;
- Contractors;
- Visitors/ tourist; and
- Other target group, noted in the MS4 Stormwater Management Program Report.

**4.1.B** The MS4 Operator shall target specific pollutant(s) in the permittee’s education program (such as, but not limited to, those listed in **Table II**). Each MS4 shall have a minimum of one target pollutant for each target audience from Section 4.1.A of this permit. The same pollutant may be used for more than one target audience, the target pollutant(s) may change annually as needed.

**Table II- Pollutants/ sources**

- Grass clippings & leaf litter;
- Fertilizer & pesticides;
- Litter, trash containment, balloon releases;
- Dumping of solid waste;
- Illegal disposal of household hazardous waste;
- Pet waste;
- Failing septic systems;
- Swimming pool discharge, including salt water pools;
- De-icing/ rock salt usage/ storage;
- Oil, grease, fluids from vehicles;
- Sediment runoff from construction/land disturbance;
- Unauthorized discharge of restaurant waste;
- Power washing;
- Unauthorized discharge of industrial waste;
- Vehicle washing; and
- Wash water/ grey water.

**4.1.C** The MS4 Operator must utilize appropriate educational resources to be used as BMPs (materials, events, activities, etc.) in conjunction with the selected pollutants for the selected target audiences. The message delivered by these BMPs needs to be applicable to the target audience and relate to the target pollution. The distribution of the BMPs needs to be effective, and when possible associated with the target audience or pollutant (such as a swimming pool water disposal flyer when applying for a swimming pool permit). BMPs which are ongoing throughout the year or permit cycle may be counted as one annual BMP. The permittees SWMP shall explain how each BMP relates to the target pollutant and target audience. The MS4 Operator may change BMPs during the permit cycle if determined appropriate through tracking and adaptive management reviews show a different BMP may be more effective for the MS4. Any changes shall be reflected in the SWMP and explained in the MS4 Stormwater Management Program Report.

1. Using **Table III**, over the permit term the MS4 Operator shall implement a minimum of the following, including the tracking and adaptive management processes:

**Group A: Each permit cycle; two (2) education and outreach BMPs from Table III.**

**Group B: Each permit cycle; four (4) education and outreach BMPs from Table III.**

**Group C: Each permit cycle; five (5) education and outreach BMPs from Table III.**

**Table III - Outreach and Education BMPs**

<b>BMPs:</b>	<b>Measurable goals (The quantity or frequency required to count as a full BMP)</b>	<b>Tracking &amp; Adaptive Management</b>
Information on the MS4 Operator’s website;	Maintain a webpage with up to date information, & working links. All links shall be checked, and the page shall be updated as necessary at minimum annually. Must be maintained the entire year.	The number of hits shall be tracked. The MS4 Operator shall use this to see which messages get reactions, and if certain messages may need more education.
Social Media posts, social media campaign;	Post a minimum of four (4) times a year, on a minimum of one social media platform. The messages shall address ways attendees can minimize or avoid adverse stormwater impacts or practices to improve the quality of stormwater runoff. The messages shall be seasonally appropriate. Must be continued for the full year.	The number of views, impressions, and other interactions shall be tracked. The MS4 Operator shall use this to see which messages get reactions, and if certain messages may need more education.
Maintain, or mark storm inlet with “No Dumping – Drains to Stream” or similar message. In addition to, or instead of, permanent wording cast into the structure of the inlet;	Placard, stencil, or paint, a minimum of 10% of all known stormwater inlets in the MS4 area per year.	Number of inlets, the location of the inlets and how they were marked shall be tracked. These areas shall be noted on MCM #3 dry weather screenings, and illicit discharge investigations as a method to determine if the markings are effective or if areas could benefit from the markings.
Require installation of permanent embossed, or precast inlets with “No Dumping-Drains to Stream” or similar message.	Requirement for all new inlets in the MS4 area.	Number of inlets, the location of the inlets shall be tracked. These areas shall be noted on MCM #3 dry weather screenings, and illicit discharge investigations as a method to determine if the markings are effective or if areas could benefit from the markings
Media/ advertising campaign: Billboard; Bus shelter/ bench; radio/ television/ movie theatre/ areas of high visibility.	Develop topics that address activities and/or pollutants of concern. Advertisement must be active for a minimum of three weeks; OR must have an estimated exposure for the duration of the campaign that is 2 times the most recent U.S. Census Bureau decennial population value for the permit area.	To the extent possible, evaluate the pollutant before the advertising campaign, and again after to see if there has been a change. The dates, time, and/or estimated media exposure for each spot broadcast shall be documented. Consider including a mechanism to track active response such as a QR Code, following the social media account(s) or a website to visit. Track those responses to determine if the advertisement was effective in reaching people.

<p>Publish articles in local newsletter, may be electronic;</p>	<p>Develop topics that are group specific and address activities and or pollutants of concern at a seasonally appropriate time. A minimum of two articles annually shall be published or emailed.</p>	<p>To the extent possible evaluate the pollutant before the article, and again after to see if there has been a change. Consider including a mechanism to track active response such as following the social media account or a website to visit. Track those responses to determine if the article was effective in reaching people.</p>
<p>Permanent Stormwater related signage;</p>	<p>Place signage in a location where the message is relevant, and highly-visible to target audience. Signage will count as an annual BMP for the year it was put in place and for each subsequent year of this permit cycle as long as each of those years tracking is taking place to message effectiveness and to ensure the signage is maintained.</p>	<p>Evaluate the pollutant before the signage, and again after to see if there has been a change. Consider including a mechanism to track active response such as following on social media, a QR Code, or a website to visit. Track those responses to determine if the signage was effective in reaching people.</p>
<p>Promote, host, or develop educational meetings, seminars, or trainings;</p>	<p>The events shall address ways attendees can minimize or avoid adverse stormwater impacts or practices to improve the quality of stormwater runoff. A minimum of two events shall be held, hosted or promoted annually. These events may address different pollutants/audiences.</p>	<p>Attendance, and any distributed education materials shall be tracked. This shall be used to gauge interest in the topic. Consider using a questionnaire or follow up survey to track if the attendees retained information or found the event beneficial.</p>
<p>Fact sheets/ brochures/ utility bill insert/ door hangers.</p>	<p>The sum of all fact sheets, brochures, bill inserts, handouts, or e-mails distributed in one year shall be at minimum equal to the most recent U.S. Census Bureau decennial housing units value for the permit area.</p>	<p>The applicable U.S. Census housing units value shall be recorded, and the amount of material shall be recorded.  This may be a combination of materials, using a targeted approach to get the appropriate material to the applicable audience.</p>
<p>Paid membership in a regional or watershed group.</p>	<p>The organization must focus on stormwater runoff.</p>	<p>The group may enact BMPs on behalf of all members, the permittee must participate to ensure their MS4 has representation, and receives some of the educational BMPs.</p>
<p>Targeted education campaign, via mail, email, or in person.</p>	<p>Minimum of one annually OR with a specific event.  (Examples: Sediment control with small building permit; leaf litter email during street sweeping season, or education brochure to all businesses conducting certain activity.)</p>	<p>Education material distributed, or amount of people contacted shall be tracked. Follow up on if noticeable behavior has changed.</p>

- 4.1.D** The MS4 Operator must create opportunities, or support activities that are coordinated by citizen groups, for residents and others to become involved with the Stormwater Management Program. The activities, (BMPs) must have an effort to impact stormwater runoff by improving water quality.
1. Using **Table IV**, the MS4 Operator shall implement a minimum of the follow including the tracking and adaptive management processes:

**Group A: Each permit cycle; one (1) involvement BMP from Table IV.**

**Group B: Each permit cycle; two (2) involvement BMPs from Table IV.**

**Group C: Each permit cycle; three (3) involvement BMPs from Table IV.**

**Co-permittees: Each permit cycle; one (1) involvement BMP in the boundaries of each co-permit.**

**Table IV Involvement BMPs**

<b>BMPs</b>	<b>Measurable goals (The quantity or frequency required to count as a full BMP)</b>	<b>Tracking &amp; Adaptive Management</b>
Stream/lake or Watershed clean-up events; Litter clean-up events such as Missouri Stream Team, Adopt-A-Spot, Adopt-A-Street, Adopt-A-Stream;	To be considered an event, the land area cleaned must be at minimum 2 acres, or 400 yards of stream/ streambank/ watershed, or 2 miles of road side. (These may be combined such as 1 acre of land and 200 yards of stream.)	Track the area or distance cleaned (by acre, yard or lane miles), the amount of waste removed (by tonnage, cubic yard, or Stream Team bag count) and the attendance. Use the waste measurements to determine if there are priority areas for litter entering stormwater, or areas for illegal dumping.
Habitat improvement; Tree planting; Invasive vegetation removal; Stream restoration.	To be considered an event, the project must be a minimum of .5 acres or 25 yards. These may be a combination. This may take place in streams, parks, areas adjacent to public waterways, and/or other green space.	Track the location(s) along with the amount planted or remove, or miles improved or restored. Analyzing the areas improved upon, the MS4 Operator shall see if there are opportunities to join the improve areas, or work on a watershed basis.
Volunteer water quality monitoring;	To be considered an event, the monitoring must be conducted at minimum once a year.	Record the sites for the volunteers, what parameters were measured/monitored, and the dates of the monitoring.
Hold events to train residents, or work a project for homeowner associations (HOAs), or other public groups. The event or training must cover stormwater related topics such as: building rain barrels; Fertilizer application training; Rain garden/ bio retention creation or maintenance; How to recognize illicit discharge activities and communicate observations to appropriate MS4 staff.	Provide one project or training at minimum annually.	Record the attendance, the topic covered, and any training materials distributed. Use these numbers and interactions during the event to determine if the project or training covered a topic of interest and/or a topic that could be brought to a different or wider audience.
School, public event, etc. educational display/booth; Provide information or displays that work to improve public understanding of issues related to water quality.	Provide one booth or display at minimum annually. The booth or display must be staffed by staff of the MS4 at minimum 50% of the time the event is open to the public.	Record the number of interactions, the overall attendance, or the number of hours the event was staffed. Record the topic covered, and any educational materials distributed. Use these numbers and interactions during the event to determine if the project or training covered a topic of interest and/or a topic that could be brought to a different or wider audience.

Stormwater related speaker series;	Provide a minimum of two sessions a year. These may be different speakers and/or audiences.	Record the attendance, the topic covered, and any training materials distributed. Use these numbers and interactions during the event to determine if the project or training covered a topic of interest and/or a topic that could be brought to a different or wider audience.
Ongoing yard waste collection, designated yard waste collection area, household hazardous waste collection, or street sweeping program.	Provide the service as an annual occurrence or at readily accessible location. For street sweeping, this shall be conducted at minimum twice a year.	Track the amount collected. If educational information is being used in conjunction with this activity track for changes due to the education. Tracking can be used with illicit discharge tracking, to determine if the rate of this type of discharges or dumping were reduced.
MS4 area wide stormwater survey.	A series of public survey to establish a baseline in the first year of the permit and then a minimum of annually throughout the permit cycle.	Use the same or similar questions to evaluate BMPs and/or full program effectiveness. Surveys can be done with utility bills, online, social media, or a combination. All participation should be tracked.

**4.1.E** The MS4 Operator shall create or support the involvement BMP(s) in Section 4.1.D. To be considered support given to the coordinating groups the MS4 Operator shall at minimum conduct the following or similar:

- Plan, or assist with planning, the event or activity;
- Contribute supplies, materials, tools, or equipment;
- Provide assistance from MS4 staff during the activity;
- Provide assistance with recruiting volunteers for events;
- Make a space available for projects, meetings, or events;
- Advertisement for the events;
- Supply disposal services;
- Arrange land or stream access;
- Financial support; and
- In-kind donations such as food.

**4.1.F** Using adaptive management as required in parts 4.1.A.3.d and 4.1.B.1.c, all MS4 Operators shall review their Public Education and Outreach on Stormwater Impacts Program, at minimum, annually and update implementation procedures and/or BMPs as necessary within the requirements of this permit. This may be conducted when preparing the MS4 Stormwater Management Program Report for submittal to the Department.

**4.2** **MCM 2. Public Participation**

The permittee shall develop and implement a comprehensive public participation program that provides opportunities for public participation in the development and oversight of the permittee’s Stormwater Program.

This program must provide opportunities for public participation of the permittee’s permit renewal and shall, at a minimum, comply with any state and local public notice requirements. Additionally, the program must provide opportunities for public participation in activities related to developing and implementing the Stormwater Management Program.

The public participation program shall, at a minimum include the following:

**4.2.A** The MS4 Operator shall hold a public notice period for a minimum of thirty (30) days to allow the public to review the draft permit, and description of the MS4s Stormwater Management Program (this may be the SWMP) prior to the submission of the renewal application to the Department.

**4.2.B** As part of the public notice, if the MS4 Operator has a public website, the required items shall be posted on their website with a way to submit comments, along with the standard public notice methods for the MS4.

1. The permittee shall respond to comments received during the comment period.



2. The MS4 Operator shall retain copies of any public comments and records of information submitted by the public received as part of the public notice process. These comments and responses shall be made available to the public or the Department upon request.

- 4.2.C** The MS4 Operator shall hold a public information meeting to provide information on, or describe the contents of, the proposed Stormwater Management Program. This meeting shall be advertised at least thirty (30) days prior to the public meeting.
1. As part of the notice of public meeting, if the MS4 Operator has a public website, the MS4 Operator shall post on that site, along with the standard public notice methods for the MS4. The notice of the public informational meeting, including the date, time and location.
  2. The meeting must be held within the service area of the MS4. Co-permittees shall hold the meeting within the boundaries of each co-permittee.
- 4.2.D** The MS4 Operator shall have a publicly available method to accept public inquiries, or concerns, and to take information provided by the public about stormwater and stormwater related topics.
1. This method, or a combination of method, shall encompass all MCMs of this permit. This method may be a phone number, website comment form, voicemail box, an email address, social media platform, or a combination of these.
  2. All reports shall be tracked, recording the topic, location, and concern. This information can help identify pollutants of concern, priority areas, pollutant sources, educational needs, and other information the MS4 Operator may use to evaluate the Stormwater Management Program.
- 4.2.E** If the MS4 Operator utilizes a stormwater management panel or committee, the MS4 Operator shall provide opportunities for citizen representatives on the panel or committee. The attendance of the meeting shall be recorded.
- 4.2.F** If the permittee has a governing board such as; County Council, City Council, or Board of Curators, a representative of the MS4 Operator, who is familiar with the MS4 Stormwater Program, shall provide an update to the governing board. This shall be conducted at minimum, annually with the status of, or updates on, the Stormwater Management Program, and compliance with the Stormwater Management Program.
- 4.2.G** **Existing permittees:** Shall evaluate their current program to ensure it is in compliance with this permit and promoted to the community. Existing permittees shall modify their program as necessary, and develop and implement elements, as necessary, to continue reducing the discharge of pollutants from the MS4 to the maximum extent practicable, following the requirements of Section 4.2 of this permit.
- 4.2.H** **Newly regulated permittees:** Shall develop a stormwater Public Participation program. The Permittees shall have the program fully implemented by the end of this permit term.
- 4.2.I** Tracking mechanisms shall be used for tracking attendance, inquiries or concerns per the requirements of Section 4.2 of this permit. Using adaptive management, all MS4 Operators shall review their Public Participation Program, at minimum, annually and update implementation procedures as necessary within the requirements of this permit. This shall be used to review how to best reach the public, the effectiveness of the mechanisms, the effectiveness of reaching the public and the MS4 Governing board and if the community and MS4 government are working together for water quality. Any additional events and/or BMPs shall be acknowledged in the Stormwater Management Program report.
- 4.3** **MCM 3. Illicit Discharge Detection and Elimination (IDDE)**  
The MS4 Operator shall implement, and enforce a program to detect and eliminate illicit discharges (as defined in 10 CSR 20-6.200 at 40 CFR 122.26(b)(2)) into the regulated MS4.
- The illicit discharge detection and elimination program shall at minimum, include the following:
- 4.3.A** A current storm sewer system map that shall be updated as needed to include features which are added, removed, or changed. This map may be paper or electronic.  
This storm sewer map, must show at a minimum:
1. The location of all MS4 outfalls. The map shall be detailed enough that the outfalls can be accurately located;
  2. The names and locations of all receiving waters of the state that receive discharges from the MS4 outfalls;
  3. The boundary of the regulated MS4 area;
  4. The map shall be readily available and used by field staff as needed; and
  5. The map and any accompanying necessary information shall be made available to the Department upon request.

**4.3.B** The MS4 Operator must record the sources of information used for the map and track, at minimum:

1. A numbering or naming system of all outfalls;
2. Dates that the outfall locations were verified/ or last field survey; and
3. For newly added outfalls, the date that it was added to the storm sewer system.

**4.3.C** The MS4 shall effectively prohibit non-stormwater discharges into the permittee's storm sewer system and implement appropriate enforcement procedures and actions.

This prohibition shall be through ordinance or other regulatory mechanism, to the extent allowable under state or local law. This may be accomplished by more than one ordinance or mechanism.

This may be done through a "nuisance code" however it must be certain that non-stormwater discharges are covered in this code. Such non-stormwater discharges may include, but are not limited to:

- Litter;
- Household hazardous waste disposal;
- Leaf disposal;
- Use of soaps & detergents with discharge to stormsewer;
- Illegal dumping of solid waste;
- Vehicle fluid disposal;
- Grass clippings;
- Pet waste; and
- Sewage.

**4.3.D** A dry weather field screening strategy.

1. The MS4 Operator shall conduct (or have conducted on their behalf) outfall field assessments. The screening shall be conducted during dry weather conditions (a minimum of 72 hours after the last precipitation event) to check for the presence of a discharge.

**Existing permittees:**

- a) A minimum of 60% of all outfalls shall be screened during the permit cycle.
- b) Priority areas, such as those listed in 4.3.H, shall be screened each year.

**Newly regulated permittees:**

- a) All outfalls shall be located and screened during the 5 year permit cycle.
- b) Priority areas shall be established.

2. This screening shall include a checklist or other tracking device to; ensure a complete inspection of each outfall, enhance consistency, and to track the field screening. This shall be used regardless of the presence of dry weather flow.

When discharge is present, the checklist or tracking device shall note the following general observations and physical characteristics at a minimum:

- Date and time;
- Weather conditions and temperature (air & water);
- Color of discharge;
- Estimate of flow rate (this may be noted qualitatively);
- Odor;
- Surface scum, algal bloom, floatables or oil sheen present;
- Deposits or stains (note the color);
- Turbidity (may be noted qualitatively);
- Stream impact including vegetation, fish, wildlife;
- Length of impacted stream; and
- Notes of an obvious source of flow (such as lawn irrigation, etc.)

**4.3.E** The MS4 Operator shall maintain diagnostic monitoring procedures to detect and investigate unknown non-stormwater flows as part of the dry weather screening program.

These procedures are for possible illicit discharges, and may be collected, and analyzed by a contracted lab, or similar agreement with another entity who is equipped and experienced in sample collect and analysis.

1. This diagnostic monitoring shall include sampling unknown discharge from MS4 outfalls that are found to be flowing or ponding more than 72 hours after the last precipitation event and considered to be an illicit discharge.
2. The samples shall be analyzed for relevant parameters to determine if a pollutant is involved.
  - a) Relevant parameters will need to be determined on a case by case basis depending on the nature of the discharge and what the potential sources may be.
  - b) The MS4 Operator shall have the ability to sample for and analyze the samples. This may be done through a contract lab or similar agreement.
  - c) Possible parameters sampled for and analyzed when deemed applicable include but are not limited to:

- pH;
- Oil and grease;
- *E. Coli* or fecal coliform;
- Surfactants or fluorescence concentration;
- Specific conductivity;
- Ammonia;
- Chlorine;
- Dissolved oxygen; and
- Fluoride/ hardness.

**4.3.F** The MS4 Operator shall maintain procedures for tracing the source of an illicit discharge. If initial screening indicates that a dry weather discharge contains pollutants, or if an illicit discharge is suspected from another reporting method, the source shall be traced. These procedures shall include mechanisms to locate and follow stormwater infrastructure. A variety of investigative tools may be used as appropriate for each situation, such as, but not limited to;

- Visually following the flow;
- Storm sewer system sampling;
- Full storm sewer map;
- Closed circuit television;
- Smoke or dye tracing; and
- Tunnel entry.

**4.3.G** The MS4 Operator shall maintain procedures for removing the source of the discharge. After locating the source, the pollutant and source must be removed. While the exact procedure will depend on the source and the circumstances, The MS4 Operator must maintain any necessary contacts with appropriate entities that may be needed for these procedures (such as an environmental cleaning company). This information shall be made available to the responsible staff.

The MS4 Operator is encouraged to work with the source of the illicit discharge to remedy the situation. Possible remedies shall include:

1. Implement source control or treatment BMPs to prevent reoccurrence of the violation;
2. Remediation or restoration of affected property.

**4.3.H** In order to prevent further illicit discharge, the MS4 Operator shall identify priority areas such as, but not limited to:

- Areas with evidence of ongoing illicit discharges;
- Areas with a past history of illicit discharges;
- Certain land use influencing stormsewer/ proximity of potential pollutant sources;
- Areas of higher population density;
- Neighborhoods with onsite sewage systems;
- Areas with known litter or dumping issues;
- Areas with large or increased number of citizen complaints; and
- Industrial areas

Annually, the MS4 Operators shall evaluate this priority area list and/or map and update as necessary to reflect changing priorities.

If a co-permittee, each co-permittee shall identify priority areas within their boundaries.

**4.3.I** The MS4 Operator shall maintain written procedures for implementing the IDDE Program, including those components described within this section, to ensure program continuity and consistency.

1. This shall include a description of this dry weather field screening strategy and implementation schedule to detect and address non-stormwater discharges, including discharges from illegal dumping and spills, to the permittee's system.
2. This shall include a description of how the discharge is evaluated and the possible parameters that are tested.
3. If contracted to another entity, the contact information shall be listed.

**4.3.J** The MS4 Operator must conduct investigations in response to field screening discoveries, spills, or in response to complaints from the public, municipal staff, or adjacent MS4s. The investigation must work to determine the source of the connection, the nature and volume of discharge through the connection, and the party responsible for the connection.

Responses shall meet the following investigation timelines:

1. Immediately respond to all illicit discharges, including spills, which are determined to constitute a threat to human health, welfare, or the environment.
2. Investigate (or refer to the appropriate agency with the authority to act) within five (5) business days, on average, any complaints, reports or monitoring information that indicates a potential illicit discharge which does not constitute a threat to human health, welfare or the environment.
3. If illicit connections or illicit discharges are observed related to, discharging to, or discharging from, an adjacent MS4 Operator's municipal storm sewer system, the MS4 Operator must notify the other MS4's Operator within 24 hours of discovery or as soon as practicable.

**4.3.K** The MS4 Operator shall have procedures for appropriate enforcement, this may include fines, the ability to collect cleanup and abatement costs, and actions to ensure that the permittee's illicit discharge ordinance (or other regulatory mechanism) is being implemented.

1. The MS4 Operator shall maintain a written description of the enforcement procedure. This shall include a copy of or link to the ordinance and/or other regulatory mechanism that the MS4 Operator will use to enforce the prohibition of illicit discharges into the MS4.

**4.3.L** The MS4 Operator shall maintain a database, or other centralized system, to track dry weather field screenings, spills, incidents, and investigations.

1. Tracking mechanisms shall be used for incidents, investigations, enforcement and follow up. This data shall be used to continuously evaluate the effectiveness of the IDDE program. This data shall be reviewed to determine if there is a new priority area.

The MS4 Operator shall record annually at a minimum:

- a) Number of outfalls screened;
  - b) Number of complaints received and investigated; and
  - c) Number of illicit discharges removed.
2. The MS4 Operator shall document all investigations to track at a minimum:
    - a) The date(s) the illicit discharge was observed and investigated;
    - b) Summary of procedures used to investigate the illicit discharge;
    - c) The outcome of the investigation including sample results and findings;
    - d) Any follow-up of the investigation including cleanup, enforcement actions, visits to confirm the illicit discharges have been removed; and
    - e) The date the investigation or issue was closed or resolved.

**4.3.M** The MS4 Operator shall inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste, this may work with part 4.1 and part 4.6 of this permit (MCM #1 and MCM #6).

**4.3.N** All MS4 Operators shall review their IDDE Program, at minimum, annually and update implementation procedures as necessary.

**4.3.O Existing permittees:** Shall evaluate their current program to ensure that it is in compliance with this permit.

1. Any revisions to the ordinance or regulatory mechanism shall be complete in the first year of the permit cycle.
2. Maintain an updated map with the items listed above. Items not included in the current map must be added within the first 2 years of the permit cycle.

**4.3.P Newly regulated permittees:** Shall develop an IDDE Program. Newly regulated permittees shall describe the IDDE program in their SWMP. The MS4 Operator shall have the program fully implemented within five (5) years of permit issuance.

1. If the MS4 Operator needs to develop the regulatory mechanism, the ordinance or regulatory mechanism must be adopted within the first 3 years of permit coverage.
2. Develop or update a map in accordance with Section 4.3.A of this Permit. The MS4 Operator must develop or update a map with the items listed above. All outfalls shall be dry weather field screened within the first five (5) years of permit issuance.

**4.3.Q** The MS4 Operator must develop and implement or maintain a training program for all municipal field staff, who, as part of their normal job responsibilities, may come into contact with or otherwise observe an illicit discharge or illicit connection to the storm sewer system.

This shall include staff who may handle materials which may become an illicit discharge. This shall include discharges through spills, improper disposal, mismanagement, improper vehicle or equipment washing or rinsing. This training may be conducted with resources online and may be focused for what topics are relevant to their position.

1. Each staff shall take this training at minimum within one year of a new employee being hired.
2. The applicable staff may include the following; (unless the MS4 Operator does not have the listed department under their jurisdiction). Additional staff or departments shall be included if appropriate;

- Fleet maintenance staff;
- Staff at facilities with fuel, chemicals, washing of vehicles or equipment;
- Road maintenance staff;
- Road salt/de-icing staff; and
- Parks, swimming pool, or golf course staff who encounter spills, equipment or vehicle washing, fueling, chemicals, etc.

3. The training dates, topics and the attendance shall be recorded.
4. Reviews of the training effectiveness shall be considered after municipal site inspections or after an incident occurs. If a certain department or facility did not perform the way they were trained, or if an issue arises that was not handled properly, the MS4 Operator should consider if the training is enough or is ineffective. The MS4 Operator shall consider ways to survey or test staff to see if the training is effective.

**4.3.R** Using adaptive management the MS4 Operator shall review their IDDE Program, at minimum, annually and update implementation procedures as necessary. This data shall be used to continuously evaluate the effectiveness of each BMP and the implementation of each BMP. Any additional BMPs shall be acknowledged in the Stormwater Management Program report.

**4.4** **MCM 4. Construction Site Stormwater Runoff Control**

The MS4 Operator shall develop, implement and enforce a program to reduce pollutants in any stormwater runoff to their MS4 from construction activities that result in land disturbance of greater than or equal to one acre. Reduction of stormwater discharges from construction activity disturbing less than one acre shall be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more.

**4.4.A** The MS4 Operator shall have a law, ordinance and/or other regulatory mechanism to require construction site runoff control BMPs at construction/land disturbance sites greater than or equal to one (1) acre or less than one acre if the construction activity is part of a larger common plan or development or sale that would disturb one acre or more. The mechanism shall include sanctions which are designed to ensure compliance, to the extent allowable under State, or local law.

**4.4.B** The MS4 Operator shall review pre-construction plans. These reviews at a minimum shall:

1. Incorporate the consideration of potential water quality impacts through procedures for site plan review. The site plan review procedures shall evaluate threats to water quality shall by considering, at minimum, the following factors:
  - a) Soil erosion potential;
  - b) Site slope;
  - c) Project size and type;
  - d) Sensitivity of receiving waterbodies;
  - e) Discharge flow type (pipe or sheet flow);
  - f) Location of discharge point in relation to receiving water;
  - g) Proximity of the site to receiving waterbodies; and
  - h) Other factors relevant to the MS4 service area.
2. Use a checklist, or other listed criteria, to ensure consistency and completeness.
3. Include requirements for construction site operators to select, install, implement, and maintain appropriate stormwater control measures.
  - a) This includes; temporary BMPs throughout the life of the land disturbance, and permanent BMPs which remain on site as required by local codes and ordinances.
4. Consider ways to minimize disturbed areas through actions such as, phased construction requirements, temporary seeding or sodding, or erosion mats to exposed areas.
5. Include requirements for construction site operators to control construction-site waste that may cause adverse impacts to water quality.

This shall include at a minimum:

- a) Discarded building materials;
- b) Concrete truck, and mortar mix washout;
- c) Chemicals (such as fertilizer, paint, oils, herbicides, pesticides);
- d) Litter; and
- e) Sanitary waste.

**4.4.C** The MS4 Operator shall establish authority for site inspections and enforcement of control measures. To the extent allowable by state, federal, and local law, all MS4 Operators shall implement procedures for inspecting construction/land disturbance projects.

The construction site runoff control program shall implement at a minimum:

1. Identify priority sites for inspection based on nature of the construction activity, topography, disturbed area, and the characteristics of soils and sensitivity of, or proximity to, receiving water;

2. Construction site inspections shall include assessment of compliance with the MS4 Operator's construction site stormwater runoff control ordinance or regulatory mechanism, and other applicable ordinances;
3. The inspections shall evaluate any structure that functions to prevent pollution of stormwater or to remove pollutants from stormwater and use enforcement polices to require BMPs are implemented and effective;
4. Final inspection, upon completion of the land disturbance and prior to final approval of construction project. Ensure all disturbed areas have been stabilized, that all temporary erosion and sediment control measures are removed.
5. The inspections conducted by the MS4 Operator shall be documented with a checklist. The checklist must include structural BMPs and check on the self-inspection which are conducted by the construction site operator. These MS4 Operator checklists may be electronic.

**4.4.D** The construction site runoff control program shall include an established, escalating enforcement policy that clearly describes the action to be taken for violations.

The program shall have written procedures to ensure compliance with the MS4 Operator's construction site runoff control regulatory mechanism. This shall include the sanctions and enforcement mechanisms the permittee will use to ensure compliance and procedures for when certain penalties, injunctions or other measures will be used.

1. The MS4 Operator must have the authority to initiate a range of enforcement actions to address the variability and severity of noncompliance.
2. Enforcement responses to violations must consider the following criteria at minimum:
  - a) Degree and duration of the violation;
  - b) Effect the violation has on the receiving water;
3. Enforcement actions shall be timely in order to ensure the actions are effective. These procedures and actions must be written and available for MS4 staff for consistency and training purposes.
4. The MS4 Operator must have a minimum of two (2) enforcement actions they are able to use. Possible enforcement actions include, but are not limited to:
  - a) Stop Work orders;
  - b) Verbal education or educational materials given to the construction site operator;
  - c) Written warnings or notice of violation;
  - d) Bonding or escrow requirements;
  - e) Fines/ penalties; and
  - f) Denials for previous non-compliance or current non-compliance at other sites.

**4.4.E** The MS4 Operator shall require the construction site operator to conduct inspections at minimum:

1. Every fourteen (14) days, when construction is active.
2. Within 72 hours of any storm event, and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased.

Checklists used for these inspections conducted by construction site operators shall either be submitted to the MS4 Operator, or the MS4 Operator shall verify that these inspections are being conducted by the construction site operator checklists during MS4 Operator inspections.

**4.4.F** The MS4 Operator shall maintain an inventory of active public and private land disturbance sites, as defined in Section 4.4 of this permit. This may be supplemented with records such as a plan review checklist and email correspondence.

The inventory must contain:

1. Relevant contact information for each project (e.g., tracking number, name, address, phone, etc.);
2. Size of the project/ area of disturbance;
3. If the site is a priority site/ how high of priority;

**4.4.G** The MS4 Operator shall track their oversight inspections. This may be done by retaining copies of records such as inspection checklists and email correspondence. The MS4 Operator must make these inventories available to the Department upon request.

The tracking must contain at a minimum:

1. Inspection dates and time;
2. Inspector name;
3. Inspection findings; and,
4. Follow up actions and dates, including corrective actions and enforcement actions.

**4.4.H Existing permittees:** Review the Stormwater Management Program including ordinances, permitting procedures, review procedures, inspection procedures and enforcement procedures to ensure compliance with these requirements. Any changes necessary to be in compliance with this permit shall be completed within the first year of this permit issuance. The inventory of active sites must be updated as new projects are reviewed and projects are completed. If the MS4 Operator needs to develop this inventory, it shall be completed within one (1) year of this permit issuance.

- 4.4.I Newly regulated permittees:** If the MS4 Operator needs to develop this construction site runoff program, the SWMP shall describe the construction site stormwater plan and scheduled implementation. Development of this program shall be completed within the first three (3) years of the permit issuance. If the MS4 Operator's ordinance or regulatory mechanism is already developed, the permittee shall include a copy of the relevant sections with the SWMP. For new permittees, the inventory must be completed with one (1) year of permit issuance and then updated as new projects are permitted.
- 4.4.J** The Stormwater Management Program must include procedures for the MS4 Operator to receive and consider information submitted by the public about land disturbance sites. This may be in combination with 4.2.D of this permit.
- 4.4.K** The MS4 Operator shall provide, or support access to, construction site runoff control training for MS4 inspectors and plan reviewers at minimum once during this permit cycle. This education shall be tracked or documented.
- 4.4.L** The MS4 Operator must provide written procedures outlining the local inspection and enforcement procedures to their inspectors to ensure consistency among the inspections.
- 4.4.M** Using adaptive management, all MS4 Operators shall review, at minimum annually, their Construction Site Stormwater Runoff Control Program and evaluate the ordinances, review procedures, inspection procedures, enforcement procedures, receipt of public information procedures, and effectiveness of training procedures to ensure compliance with these requirements and determine if changes are needed. This annual review may include but is not limited to:
1. Evaluating the most common violations, how the violations are handled, how many are escalated;
  2. If the education program can assist in reducing violations;
  3. Determining if the site plans match the sites when violations arise or if additional items need to be evaluated at plan review;
  4. Assessing public complaints being addressed in a timely manner; and
  5. Evaluating if the inspections thorough and consistent across different sites.

Any additional BMPs shall be acknowledged in the SWMP.

**4.5 MCM 5. Post-Construction Stormwater Management in New Development and Redevelopment**

The MS4 Operator shall continue or develop, implement, and enforce a program to address the quality of long-term stormwater runoff from new development and redevelopment projects that disturb equal to and greater than one acre, including projects less than one acre that are part of a larger common plan of development or sale that would disturb one acre or more and that discharge into the regulated MS4.

The MS4's program shall ensure that controls are in place that have been designed and implemented to prevent or minimize water quality impacts

- 4.5.A** The MS4 Operator shall maintain and utilize an ordinance(s) or other regulatory mechanism(s) to address post-construction runoff from new development and redevelopment projects to the extent allowable under state or local law for sites equal to or greater than one acre including projects less than one acre that are part of a larger common plan of development or sale. The goal of this approach is to arrive at designs that protect sensitive areas, minimize the creation of stormwater pollution, utilize BMPs that effectively remove stormwater pollution, and attempt to maintain predevelopment runoff conditions.

The MS4's program shall ensure that controls are in place that have been designed and implemented to prevent or minimize water quality impacts from stormwater, after construction.

1. If adopting a set of standards from another MS4 or other established standards, the MS4's ordinance may incorporate by reference, therefore the MS4 does not need to incorporate the entire guidance into their codes.
2. This program may be accomplished through one or multiple ordinances or regulatory mechanisms.

- 4.5.B** The MS4 Operator shall continue or develop a strategy to minimize water quality impacts. This shall include a combination of structural and/or non-structural controls (BMPs) appropriate for the permittee's community.

1. Structural controls include but are not limited to; extended detention basins, grass swales, bio-retention, permeable surfaces, sand filter basins, stormwater planters, proprietary BMPs.

The ordinance or regulatory mechanism for structural post-construction controls, or water quality facilities, shall include:

- a) Adoption or development of numeric or technical performance and/or design standards to control post-construction stormwater discharges.

These post-construction stormwater standards are for designing, installing, implementing, and maintaining stormwater control measures which may include, but are not limited to BMPs that; infiltrate, evapo-transpire, harvest, detain, retain, and/or reuse stormwater.

The MS4 Operator must adopt or maintain local stormwater discharge design standards that consider parameters such as; site discharge volume, rate, duration, and frequency for new development and redevelopment sites with the intent to minimize the impact of stormwater runoff on water quality.

2. Non-structural controls include but are not limited to; stream buffers, no mow zones, preservation of open spaces, tree preservation, impervious cover reduction, land use planning, and low impact development.

The ordinance(s) or regulatory mechanism(s) for non-structural post-construction controls, shall include:

- a) Adoption or development of preventative actions that involve management and source controls such as, but not limited to:

- Policies and ordinances that provide requirements and standards to direct development to identified areas;
- Protection of sensitive areas such as wetlands and riparian areas;
- Maintain and/or increase open space (which may include a dedicated funding source for open space acquisition);
- Maintain requirements for buffer zones along water bodies;
- Require minimizing impervious surfaces;
- Require minimizing disturbance of soils and vegetation;
- Policies or ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure;
- Programs which incentivize the use of green infrastructure;
- Requirements for minimization of directly connected impervious areas; and
- Tree preservation ordinances.

- 4.5.C** Pre-construction plan review shall be conducted by the MS4 Operator to assess site characteristics at the beginning of the construction site design phase to ensure adequate planning for stormwater program compliance. The structural or non-structural controls chosen shall; protect sensitive areas, minimize the creation of stormwater pollution, and effectively reduce stormwater pollution. This can be achieved by reasonably mimicking pre-construction runoff conditions on all affected new development projects, or the permittee may achieve this goal through a method more appropriate for its community.
1. The plan review process shall use a checklist. This may be part of the same plan review in MCM 4.
  2. The plan review process shall evaluate non-structural BMP selection first, such as comprehensive plans, zoning ordinances, buffer strips, and/or maximization/preservation of open space. Non-structural BMPs primarily prevent stormwater runoff from a site, which could influence the options for structural BMPs which help mitigate the stormwater related impacts after they have occurred.
- 4.5.D** The MS4 Operator shall have ordinances or similar enforcement mechanisms to ensure adequate long-term operation and maintenance (O&M) of the selected BMPs, including, as appropriate, agreements between the MS4 Operator and other parties such as post-development landowners or regional authorities.
1. Long term O&M shall be addressed during the plan review and approval process.
  2. Copies of O&M manuals shall be retained by the party responsible for the post-construction BMP, and with the MS4 Operator. This may be done electronically.
- 4.5.E** The MS4 Operator shall inspect, or require inspection of, each water quality structural and non-structural water post-construction BMP according to the following at minimum:
1. A minimum of one (1) inspection shall be conducted during construction, and one (1) inspection before the site is finalized, to verify water quality facilities are built as designed and any applicable boundaries or practices for non-structural BMPs are being observed. This may be conducted in combination with MCM 4 inspections.
    - a) The MS4 inspector shall have access to the approved plans to ensure proper installation.
  2. A minimum of once in the first three years after the installation by, the MS4 Operator.
  3. Annually by the owner or operator of the post-construction BMP, or by the MS4 Operator. If completed by the BMP owner or operator, this inspection report shall be submitted to the MS4 Operator for evaluation and review.
  4. The MS4 Operator shall inspect a minimum of 60% of all water quality post-construction BMPs within the five year permit cycle. This must include installations with ongoing or open enforcement issues.
- 4.5.F** The MS4 Operator must maintain a plan designed to ensure compliance with the MS4's post-construction water quality regulatory mechanism. This plan shall include escalating enforcement mechanisms the MS4 Operator will use to ensure compliance. The MS4 Operator must have the authority to initiate a range of enforcement actions to address the variability and severity of noncompliance.
1. Enforcement responses to violations must consider at minimum:
    - a) Degree and duration of the violation;



- b) Effect the violation has on the receiving water;
- c) Compliance history of the post-construction BMP owner or operator; and
- d) Cooperation of the owner or operator with compliance efforts.

**4.5.G** Enforcement actions shall be timely in order to ensure the actions are effective. The MS4 Operator shall begin enforcement actions within thirty (30) days of discovering a violation.

The MS4 Operator shall maintain a minimum of two possible sanctions. These include, but are not limited to:

- 1. Education regarding the BMP and verbal warnings;
- 2. Written warnings or notice of violation (this includes email notification);
- 3. Property lien; and
- 4. Fines.

**4.5.H** The MS4 Operator shall maintain an inventory tracking the water quality post-construction BMPs. This inventory must contain, at a minimum:

- 1. Relevant contact information for the responsible person(s) or entity (e.g., tracking number, name, address, phone, etc.);
- 2. The type of post-construction BMP;
- 3. Applicable operations and maintenance documents;
- 4. Date the MS4 Operator approved the construction site plan; and,
- 5. If the water quality facility is owned or operated by the MS4, the tracking shall also include any maintenance, such as sediment clean-out or replanting.

**4.5.I** The MS4 Operator shall also track the post-construction BMP inspections. This may be done by retaining copies of records such as inspection checklists and email correspondence. The MS4 Operator must make these inventories available to the Department upon request.

The MS4 Operator shall track at a minimum:

- 1. Inspection dates/ times;
- 2. Inspector name(s);
- 3. Inspection findings; and,
- 4. Follow up actions including all enforcement actions.

**4.5.J Existing permittees:** Evaluate the ordinances, permitting procedures, review procedures, inspection procedures and enforcement procedures to ensure compliance with these requirements and determine if changes are needed. Any changes necessary to be in compliance with this permit shall be completed within the first two (2) years of permit issuance. The inventory of water quality facilities must be updated as new facilities are added and projects are completed. If the MS4 Operator needs to develop this inventory, it shall be completed within two (2) years of this permit issuance.

**4.5.K Newly regulated permittees:** Shall develop the ordinance or regulatory mechanism. Development of this program shall be completed within the first five (5) years of the permit issuance.

For new permittees, the inventories of public and private post-construction water quality BMPs must be completed within two (2) years of permit issuance and then updated as new projects are permitted and projects are completed.

**4.5.L** The MS4 Operator shall provide appropriate training for MS4 inspectors at minimum once every permit cycle. This may include Green Infrastructure training, or specific operation of proprietary post-construction BMPs. The MS4 shall provide overall training to explain the function of both structural and non-structural post-construction water quality BMPs.

**4.5.M** Using adaptive management, all MS4 Operators shall review, at minimum annually, their Post-Construction Site Stormwater Management in New Development and Redevelopment Program and evaluate effectiveness of the overall program and determine if changes are needed. This annual review may include but is not limited to:

- 1. Reviewing the number and types of developments;
- 2. How many BMPs were installed/inspected;
- 3. The amount of watershed area being treated;
- 4. The types of violations found and how frequently; and
- 5. How education could improve the effectiveness of the program.

Any additional programmatic BMPs shall be acknowledged in the Stormwater Management Program Report.

**4.6. MCM 6. Pollution Prevention/Good Housekeeping for Municipal Operations**

The permittee shall develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.

- 4.6.A** The MS4 Operator shall maintain and utilize an employee training program for MS4 municipal operations staff. The training shall be given at minimum annually to all MS4 staff who work with material handling, at MS4 owned or operated vehicle/equipment maintenance areas, storage yards, and material storage facilities. This may be broken up into staff units, or by applicable topics.
- 4.6.B** The training shall be used to prevent and reduce stormwater pollution.  
The training shall cover a minimum of the following topics/ activities (if applicable to the MS4):
1. Vehicle and equipment washing;
  2. Fluid disposal and spills;
  3. Fleet, equipment, and building maintenance;
  4. Park and open space maintenance procedures (including fertilizer, herbicide, pesticide application);
  5. New construction, road maintenance, and land disturbances;
  6. Stormwater system maintenance;
  7. MS4 operated salt and de-icing operations;
  8. Fueling;
  9. Solid waste disposal;
  10. Street sweeper operations; and
  11. Illicit Discharges.
- 4.6.C** The MS4 Operator shall:
1. Maintain material to use in the training program, such as those available from the EPA, the state, or other organizations.
  2. Maintain written procedures for the training program. Include a description of how this training will coordinate with all other minimum control measures (such as Illicit Discharge), monitoring and TMDL implementations where applicable.
  3. Maintain a written schedule to offer topic specific training when it is appropriate. Such as, swimming pool discharges in the summer, leaf disposal in the fall, proper salt clean-up and usage in the winter.
- 4.6.D** The MS4 Operator shall maintain a list of all municipal operations/facilities that are impacted by this operation and maintenance program.  
This shall include a minimum of the following if owned and operated by the MS4 and if applicable to the MS4:
1. Maintenance yards;
  2. Fleet or maintenance shops, including parks department;
  3. Storage yards;
  4. Parks, golf courses, swimming pools, and splash pads;
  5. Municipal parking lots;
  6. Salt/sand storage locations;
  7. Snow disposal areas; and
  8. Other locations expected to contribute floatables and/or pollutants.
- 4.6.E** The MS4 Operator shall maintain a list of industrial facilities the MS4 Operator owns or operates which are subject to NPDES permits for discharges of stormwater associated with industrial activity. The list shall include the permit number or a copy of the No Exposure Exemption Certification (if applicable) for each facility.  
This includes; municipal projects with a land disturbance permit, wastewater facilities, airports, etc.  
NPDES permitted facilities not owned or operated by the permittee are not required to be part of the list; however, the MS4 Operator should be familiar with all such facilities in their MS4 service area as they may signify a priority area for the IDDE program.
- 4.6.F** The MS4 Operator shall develop or maintain controls for reducing or eliminating the discharge of floatables and pollutants from municipal facilities listed in Section 4.6.D and 4.6.E.  
These controls shall include at a minimum, where applicable:
1. A list of potential pollutant sources at each facility, such as materials used and stored on site;
  2. A minimum of annual inspections of all municipally owned or operated facilities for stormwater issues;
    - a) Records shall be kept for inspections and follow up. This may be a checklist, and may be electronic;
  3. Use of structural controls/BMPs to reduce or prevent pollutants from entering waters of the state or into another MS4 where needed.
    - a) A map with descriptions of these BMPs shall be maintained for each facility;
  4. All paints, solvents, petroleum products, and petroleum waste products (except fuels) under the control of the permittee shall be stored so these materials are not exposed to stormwater;
  5. Sufficient practices of spill prevention, control, and/or management shall be provided to prevent any spill of these pollutants from entering waters of the state;
    - a) This shall include spill kits when liquid product is stored at a facility; and

- b) Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall also prevent the contamination of groundwater.
6. Tracking of rock salt/brine or other deicer usage;
7. Maintaining municipal salt storage area(s) after use of rock salt, at minimum:
- a) Sweep and/or shovel spillage in loading area and storage area, and
  - b) Unload salt hoppers or keep under cover when salt is in the hopper.
- 4.6.G** The MS4 Operator shall have procedures for proper disposal of waste removed from the MS4 structures and areas of jurisdiction.  
This waste, shall include at minimum, if applicable to the permittee:
1. Street sweeper spoils and washout;
  2. Accumulated sediment;
  3. Dredged materials;
  4. Floatables, trash and litter;
  5. Leaves, other organic matter; and
  6. Other debris.
- 4.6.H** The MS4 Operator shall maintain and utilize the following procedures, at minimum, for the washing of all municipal vehicles and equipment (if applicable to the MS4):
1. Use of any soap or detergent shall only be where there is connection to sanitary sewer or equivalent treatment; and
  2. Any wash or rinse water that contains pollutants such as salt, oils, grease, sediment, grass clippings, lawn chemicals, or pesticides shall not be discharged to waters of the state or the MS4 system without appropriate treatment.
  3. Any washing or rinsing activities shall be conducted in an appropriate area so the water is treated. This area(s) shall be marked on the map of the facility.
- 4.6.I** The MS4 Operator shall maintain written explanation of the controls, procedures, inspection schedules, and explanation of tracking of these controls. Tracking may be done by retaining inspection reports or checklists.  
Individual Stormwater Pollution Prevention Plans or one overarching Operations and Maintenance Manual for all applicable MS4 facilities may be used to comply with this requirement. If a unified document is used, each individual site shall be familiar with the document, and a copy shall be present on each site referenced in the document or available electronically.  
Annually, the MS4 Operator shall evaluate the results, controls, and inspection procedures to ensure compliance with these requirements and determine if changes are needed. This evaluation may also aid in finding priority areas or pollutants in relation to MCM 3, or adding more education in relation to MCM 1.
- 4.6.J** The MS4 Operator shall maintain procedures to determine if there are impacts to water quality for new flood management projects, if applicable. Any flood management projects shall require the protection of water quality in the standards that are used to plan, design, build, and maintain stormwater infrastructure.  
Flood management projects are those projects developed or designed to reduce flooding.
- 4.6.K Existing permittees:** Shall evaluate the current Stormwater Management Program including training, inspection procedures, and other municipal operation procedures to ensure compliance with these requirements. Any changes necessary to be in compliance with this permit shall be completed within one (1) year of this permit issuance.
- 4.6.L Newly regulated permittees:** Shall develop this program. The SWMP shall describe the pollution prevention/ good housekeeping plan and scheduled implementation. Development of this program shall be completed within the first five (5) years of the permit issuance.
- 4.6.M** Using adaptive management, all MS4 Operators shall review their Municipal Operations Program, at minimum, annually and update implementation procedures as necessary within the permit requirement. Any additional BMPs shall be acknowledged in the Stormwater Management Program Report.

## **PART 5. MONITORING, RECORDKEEPING, AND REPORTING**

### **5.1 Monitoring**

- 5.1.A** The MS4 Operator shall retain records of any monitoring information used to complete the application for this operating permit, implementation of any part of this operating permit, and implementation for any part of the permittee's Stormwater Management Program for a period of at least three (3) years from the date of the sample, measurement, or analysis. This period may be extended by official written request by the Department at any time. These records may be maintained electronically.

Monitoring data shall include, if applicable, the below information:

1. All calibrations and maintenance records of sample or analytical equipment;
2. All original strip chart recordings for continuous monitoring instrumentation;
3. The date, location, and time of sampling or measurement;
4. Name of the individual(s) who performed the sampling or measurements;
5. The date(s) analyses were performed;
6. Name of the individual(s) who performed the analyses;
7. The analytical techniques or methods used; and
8. The results of such analyses.

**5.1.B** Any monitoring conducted for the purpose of implementation of any part of this permit shall be conducted in accordance to test procedures approved under 40 CFR Part 136 unless another method is required under 40 CFR subchapters N or O.

**5.2 Recordkeeping**

All records required by this permit may be maintained electronically, as long as they are accessible upon request by the Department. If a non-electronic version is kept, the permittee shall retain the most recent versions of the records and shall be accessible to the Department upon request.

**5.2.A** The permittee shall retain records of all activities requiring recordkeeping by the Stormwater Management Program, a copy of the NPDES permit, a copy of all ordinances, policies, and formal procedures for all six (6) MCMs and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the report or application. This period may be extended by official request of the Department at any time.

**5.2.B** The permittee shall retain the most recent version of their SWMP at a reasonable location accessible to the Department, this may be done as a publicly available website.

**5.2.C** If requested in writing by the public, the permittee shall submit the items required under Part 5 of this permit, including a copy of the permit, SWMP, or application.

**5.2.D** The permittee shall submit the items contained in Part 5 of this permit to the Department upon request.

**5.3 MS4 Stormwater Management Program Report**

**5.3.A** A report to the Department on the status of the MS4's program is due annually on or before February 28th. This report shall cover the previous year from January 1<sup>st</sup> to December 31<sup>st</sup>. The report shall be submitted on the Department approved, MS4 Stormwater Management Program Report form. If approved by the Department, permittees may submit the MS4 Stormwater Management Program Report using an alternative report format. The MS4 Operator shall submit the MS4 Stormwater Management Program Report containing, at a minimum:

1. Information regarding progress toward achieving the statutory goal of reducing the discharge of pollutants to the maximum extent practicable;
2. The status of the MS4's compliance with permit conditions;
3. Assessment(s) of the appropriateness of identified BMPs and corresponding measurable goals for each MCM;
4. A summary of results of information collected and analyzed during the reporting period, including monitoring data or quantifiable values per the MS4's measurable goals;
5. A summary of the TMDL Assumptions and Requirement Attainment Plan (ARAP), if applicable, containing the implementation status of BMPs and measurable goals specific to the TMDL ARAP or progress toward implementing the schedule for implementation of the TMDL ARAP. The summary shall also include any changes to BMPs and corresponding measurable goals;
6. If the permittee is utilizing integrated planning, the permittee shall provide a summary of the status of the integrated plan; and
7. A statement if the permittee is relying on another entity to satisfy some of the permittee's permit obligations. If applicable, the permittee shall supply the name of the entity, the name of the entity's primary contact person, and other relevant contact information.

**5.3.B** Electronic Discharge Monitoring Report (eDMR) Submission System. Per 40 CFR Part 127 National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, reporting of effluent monitoring data and any report required by the permit (unless specifically directed otherwise by the permit), shall be submitted via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data for the NPDES program. The eDMR system is currently the only Department-approved reporting method for this permit unless specified elsewhere in this permit, or a waiver is granted by the Department. The facility must register in the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due.

**PART 6. SPECIAL CONDITIONS FOR TOTAL MAXIMUM DAILY LOADS**

## **6.1 MS4s Subject to Total Maximum Daily Loads (TMDL)**

- 6.1.A** Any regulated MS4 identified in an EPA approved or established TMDL with an applicable Wasteload Allocation (WLA) shall implement steps toward the attainment of applicable WLAs in accordance with 40 CFR 122.44(k)(2) and (3).
- 6.1.B** The MS4 Operator shall develop a TMDL ARAP to address the TMDL's assumptions and requirements where applicable.
- 6.1.C** The TMDL ARAP shall be incorporated into the Stormwater Management Program and include, at a minimum:
1. A plan to identify potential sources of the pollutant(s);
  2. A plan to implement BMPs to address the sources within the MS4 service area; and
  3. A schedule, including beginning and ending milestones, which are expressed as month and year to implement planned BMPs.
- The schedule for the implementation of the TMDL ARAP shall be completed as soon as practicable, but is not limited to the five year term of this operating permit as attainment can take years or even multiple permit terms.
- 6.1.D** BMPs shall be developed or designed with a purpose of reducing the pollutant(s) of concern. The ARAP shall list each BMP and shall contain a description of the BMP, the purpose of the BMP, and the expected result of the BMP.
- 6.1.E** Measurable goals shall be established for each BMP or in conjunction with multiple BMPs.
1. Each measurable goal shall contain a statement clearly indicating how it will be established to determine the appropriateness of identified BMPs and progress toward the expected results of the BMP.
  2. Measurable goals shall be quantifiable; however, if it is not feasible to utilize a measurable goal that is quantifiable, then the permittee shall provide justification indicating why the measurable goal cannot be quantifiable.
  3. If applicable, measurable goals shall also utilize interim and completion milestone dates, and a periodic frequency of measurement to document progress. Interim and final milestone dates shall be established with a format of month and year, or as 1st, 2nd, 3rd, 4th, and 5th year of the operating permit cycle.
- 6.1.F** An iterative process shall be utilized by the permittee documenting how each BMP is evaluated and subject to replacement or modification. The permittee shall apply reasonable further progress by replacing or modifying ineffective BMPs with effective BMPs.
- 6.1.G** If the permittee is subject to an approved or established TMDL, the permittee shall draft and submit their TMDL ARAP to the Department as soon as practicable but no later than 30 months after the date the EPA approves or establishes the TMDL or the effective date of their operating permit, whichever is later.  
The initial TMDL ARAP is to be submitted to the Department's Water Protection Program, MS4 Team for review and approval at [MS4@dnr.mo.gov](mailto:MS4@dnr.mo.gov) or Water Protection Program, MS4 Team, P.O. Box 176, Jefferson City, MO 65102. The deadline for the TMDL ARAP may be extended through written request by the permittee and written approval by the Department.
- 6.1.H** The MS4 Operator shall submit annual TMDL ARAP status reports to the Department on February 28th of each year until the TMDL ARAP has been submitted.  
The annual status report shall provide a brief update on the status of completion of the TMDL ARAP to be submitted to the Department. The deadline for the TMDL ARAP status report may be extended through written request by the permittee and with written approval by the Department. The annual status report shall be submitted to the Department's Water Protection Program, MS4 Team at [MS4@dnr.mo.gov](mailto:MS4@dnr.mo.gov) or Water Protection Program, MS4 Team, P.O. Box 176, Jefferson City, MO 65102.
- 6.1.I** If the Department approves the TMDL ARAP, it will be presumed that the TMDL ARAP is affordable by the permittee. If the Department disapproves a submitted TMDL ARAP and requires any additional or different controls or expenses, the Department will conduct an affordability analysis in support of the disapproval unless waived by the permittee. In addition to the disapproval, the Department shall provide an itemized list of recommendations, discrepancies, and plan corrective action(s) to the permittee in written correspondence, which will also provide deadlines for any corrective action(s).
- 6.1.J** If the TMDL ARAP has been submitted to the Department but has not received approval, the MS4 Operator is not required to implement any actions listed in their TMDL ARAP and shall notify the Department of this in their MS4 Stormwater Management Program Report.
- 6.1.K** If the TMDL ARAP has received Department approval, the permittee shall implement their TMDL ARAP in accordance to schedules established in the TMDL ARAP.  
Implementation of all TMDL ARAP control measures shall be documented and retained by the permittee, and made available to the Department or the EPA upon request.

- 6.1.L** If the MS4 Operator has an approved TMDL ARAP, the permittee shall provide a summary listing the BMPs and the status of the measurable goals in the MS4 Stormwater Management Program Report.
- 6.1.M** If the MS4 Operator is subject to a TMDL, the MS4 Operator may demonstrate no additional controls are needed beyond the successful implementation of the six Minimum Control Measures (MCMs), which includes modifications to the BMPs or measurable goals, for the attainment with the TMDL's assumptions and requirements. The demonstration is subject to Department approval. The MS4 Operator shall contact the Water Protection Program's MS4 Team to begin the process.
- 6.1.N** If the permittee has already developed an integrated plan, a separate ARAP is not be required provided the integrated plan meets the requirements outlined in section 6.1 of this permit. Review and rating of an integrated plan is subject to the same requirements of section 6.1 of this permit. The MS4 Operator shall contact the Water Protection Program's MS4 Team to begin the process.
- 6.1.O** Permittees subject to existing TMDL Assumptions and Requirements shall submit their plan and status of implementation to the Department with the MS4 Stormwater Management Program Report required by this permit. Existing plans shall be subject to the same conditions listed in items 6.1.
- 6.1.P** If the EPA approved or established TMDL indicates that the permittee does not cause or contribute to the impairment, the permittee is not required to develop and implement any action contained in Part 6 of this permit.

## **PART 7. STANDARD PERMIT CONDITIONS**

- 7.1.A** Duty to Comply. The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and the Federal Clean Water Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal.
- 7.1.B** Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.
- 7.1.C** Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance may also include adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems installed by a permittee only when necessary to achieve compliance with the conditions of the permit.
- 7.1.D** Inspection and Entry. The permittee shall allow the Department or an authorized representative (including an authorized contractor acting as a representative of the Department), upon the presentation of credentials and other documents as may be required by law to:
1. Enter the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit.
  2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit, and have the authority to request records be provided electronically in absentia.
  3. Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit.
  4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Act, any substance or parameters at any location.
- 7.1.E** Monitoring Methods. See Part 5.1 of this operating permit.
- 7.1.F** Need to Halt or Reduce Activity Not an Excuse. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

- 7.1.G** Permit Actions. This permit may be modified, revoked, reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.
- 7.1.H** Duty to Reapply.
1. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.
  2. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
  3. A permittees with currently effective general permit shall submit an application for renewal at least 180 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.) Continuation of expiring permits are in accordance with 10 CSR 20-6.010(10)(C) and subsequent amendments.
- 7.1.I** Administrative Continuation of the Permit. If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with 10 CSR 20-6.010(10)(C) and remain in force and effect. Any permittee who was granted permit coverage prior to the expiration date, and who has applied for renewal at least 180 days prior to the expiration date, will automatically remain covered by the continued permit until the earlier of:
1. Reissuance or replacement of this permit, at which time the permittee shall comply with the application conditions of the new permit to maintain authorization to discharge;
  2. Notice of termination;
  3. Issuance of a site-specific permit or alternative general permit for MS4 discharges; or
  4. A permit decision by the Director not to reissue this general permit, at which time the permittee shall seek coverage under an alternative general permit or a site-specific permit.
- 7.1.J** Permit Transfers. Subject to 10 CSR 20-6.010(11), an operating permit may be transferred upon submission to the Department. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the MCWL or the CWA. (See 40 CFR 122.61. In some cases, modification or revocation and reissuance is mandatory.)
- 7.1.K** Procedures for Modification or Revocation. If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific (individual) permit or alternative general permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR 20-6.010(13), 10 CSR 20-6.200(1)(B) or 10 CSR 20-6.200(6).
- 7.1.L** If this permit is reopened, modified, or revoked pursuant to this section, the permittee retains all rights under Chapters 536 and 644 Revised Statutes of Missouri upon the Department's reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.
- 7.1.M** The Department may require the permittee to apply for and obtain a site-specific or alternative general permit if:
1. The permittee is not in compliance with the conditions of this general permit.
  2. The discharge no longer qualifies for this general permit due to changed site conditions and regulations.
  3. The permittee will be notified in writing of the need to apply for a site-specific permit or an alternative general permit. When a site-specific permit or alternative general permit is issued to the authorized permittee, the applicability of this general permit to the permittee will be terminated upon the effective date of the site-specific or alternative general permit, whichever the case may be.
- 7.1.N** Site-Specific Permit or Alternative General Permit. The permittee may apply for a site-specific permit or alternative general permit in lieu of coverage under this general permit. In such cases, the permittee shall submit an application for the alternate

permit in accordance with the requirements of 10 CSR 20-6.200 with reasons supporting the request. The request may be granted by issuance of any site-specific permit or an alternative general permit.

- 7.1.O** Property Rights. This permit does not convey any property rights of any sort, or any exclusive privilege.
- 7.1.P** Duty to Provide Information. The permittee shall furnish to the Department, within a reasonable amount of time, any information which the Department may request to determine whether cause exists for modifying, revoking, and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.
- 7.1.Q** Falsification Penalties. Any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than six months, or by both. Second and successive convictions for violations under this paragraph by any person shall be punished by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two years, or both;
- 7.1.R** Reopener Clause. Nothing in this permit shall prevent the Department from re-opening, modifying, or revoking this permit as authorized by law.
- 7.1.S** Signatory Requirements.
1. All permit applications shall be signed and certified in accordance with 40 CFR 122.22 and 10 CSR 20-6.010(2)(B) by either a principal executive officer or by an individual having overall responsibility for environmental matters for the permittee.
  2. All reports required by this permit, and other information requested by the Department shall be signed by a person described in section 2.2.B of this permit, or by a duly authorized representative of that person. A person is a duly authorized representative if:
    - a) The authorization is made in writing by a person designated in Section 2 of this permit;
    - b) The authorization specifies an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of stormwater manager, operator, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the permittee. A duly authorized representative may thus be either a named individual or any individual occupying a named position.
    - c) The written authorization is submitted to the Director; and
    - d) If an authorization under section 2.2.B is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new, written authorization satisfying the requirements of this paragraph must be submitted to the Director prior to, or together, with any reports, information, or applications signed by an authorized representative.



**MISSOURI DEPARTMENT OF NATURAL RESOURCES**  
**FACT SHEET**  
**FOR THE PURPOSE OF RENEWAL**  
**OF**  
**PHASE II SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)**  
**MO-R04C000**  
**MASTER GENERAL PERMIT**

The Federal Water Pollution Control Act [Clean Water Act (CWA)] Section 402 of Public Law 92-500 (as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the CWA). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Missouri Department of Natural Resources (Department) under an approved program, operated in accordance with federal and state laws (Federal CWA and Missouri Clean Water Law Section 644 as amended). Permits are issued for a period of five (5) years unless otherwise specified.

Per 40 CFR 124.56, 40 CFR 124.8, and 10 CSR 20-6.020(1)(A)2., a Fact Sheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the permit. A Fact Sheet is not an enforceable part of an MSOP.

This Fact Sheet is for a Master General Permit.

**Part I – Facility Information**

Facility Type:	Industrial; Stormwater
Facility SIC Code(s):	#9511
Facility NAICS Code:	#924110
Facility Description:	Urban Stormwater Runoff. The permittee's MS4 collects and routes stormwater from industrial, commercial, roadways, and residential areas located within the permittee's municipal boundary and discharges the stormwater to waters of the state.

This Permit establishes Stormwater Management Program and Stormwater Management Plan (SWMP) requirements for all permit holders under this permit.

**Clarification:**

Coverage under this general permit may be issued to Public entities located inside the service area of a publicly owned separate storm sewer system designated by the Department if it is determined that its discharges from the MS4 have caused, or have the potential to cause, an adverse impact on water quality. Extension of such coverage shall be at the discretion of the Department.

**Significant Changes to this permit include:**

- ✓ Establishment of terms and conditions of the permit necessary to meet the MS4 permit standard in clear, specific and measurable terms per 40 CFR 122.34.
- ✓ Establishment of public notice, public comment and public hearing process necessary to meet the permit standard per 40 CFR 124.10.

**DEFINITIONS**

The definitions in this section shall apply to this permit only, and do not supersede or replace the definitions contained in Section 644.016, RSMo, 10 CSR 20-2.010, and 10 CSR 20-6.200(1)(D), which are all incorporated herein by reference. To aid understanding of some key terms, explanations of several statutory and regulatory definitions are provided. However, in the event of any inconsistencies, the statutory and regulatory definitions are controlling.

**Adaptive management:** A repetitive or cyclical process of decision making that requires monitoring activities to adjust behavior, decisions, and actions and to incorporate new knowledge and actual changes. Adaptive management enables MS4 permittees to continually improve their stormwater control strategies and practices as they implement their programs and learn from experience to better control pollutant discharges. The process starts with the evaluation of a BMP with its designated measurable goal. If the BMP is found effective, then the MS4 Operator continues with this BMP until the next round of evaluation. If the BMP is found to be ineffective, then the MS4 Operator is required to conduct analysis to determine what can be altered or modified or if the BMP needs to be replaced.

**Best Management Practices (BMPs):** “Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state. BMPs also include treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage areas.” 10 CSR 20-6.200(1)(D)1.

- BMPs can be temporary or permanent, and include structural items or non-structural practices or activities including schedules of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants.
- BMPs encompass both the enforceable terms and conditions of this permit as well as particular activities and practices selected by the permittee that will be undertaken to meet the permit requirements but that are not themselves enforceable.

**Clear, specific, and measurable terms:** This permit is written to contain clear, specific, and measurable terms, using plain language to clearly establish permit requirements and the standards that will be used to assess compliance. “Such terms and conditions may include narrative, numeric, or other types of requirements (*e.g.*, implementation of specific tasks or best management practices (BMPs), BMP design requirements, performance requirements, adaptive management requirements, schedules for implementation and maintenance, and frequency of actions).” 40 C.F.R. § 122.34(a)

**Common Plan of Development or Sale:** An area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one proposed plan. This plan may consist of many small construction projects that collectively add up to one or more acres of total disturbed land. For example, an original common plan of development of a residential subdivision might identify the streets, house lots, and areas for parks, schools and commercial development that the developer plans to build or sell to others for development. All these areas would remain part of the common plan of development or sale until the intended construction is completed.

**Construction activities:** Clearing, grading, and excavating that result in land disturbance of equal to or greater than one (1) acre. Construction activity also includes the disturbance of less than one (1) acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one (1) acre. *See* 10 CSR 20-6.200(1)(D)28.

**Construction Site Operator:** The entity or entities with operational control over construction plans and specifications including the ability to make modifications to those plans and specifications; or with day-to-day operational control of those activities at a project that are necessary to ensure compliance with a Stormwater Pollution Prevention Plan (SWPPP) for the site or other permit conditions. Typically this is the owner of the site or the general contractor of the project.

**Control Measure:** Any BMP or other method used to prevent or reduce the discharge of pollutants to waters of the state.

**Conveyance:** Curbs, gutters, artificial channels, swales, ditches, drains, pipes, catch basins, paved or unpaved channels, storm drains, or other constructed or natural features designed or utilized for routing of stormwater.

**Co-permittee:** “A permittee to a state operating permit that is responsible only for permit conditions relating to the discharge for which it is owner or operator, or both.” 10 CSR 20-6.200(1)(D)4.

An operator of a regulated municipal separate storm sewer system (MS4) that applies jointly with one or more other applicants for coverage under a single municipal stormwater permit. Applicants within one urbanized area, or within a common watershed, or in an area served in common by one service provider may apply as co-applicants to share the administrative responsibilities of the application process and to become co-permittees under an issued permit.

A co-permittee must comply with the conditions of the permit relating to discharges from the MS4 the co-permittee owns or operates. Co-permittees will need to cooperate with each other to develop, implement, and report on their programs.

**Discharge:** “[T]he causing or permitting of one or more water contaminants to enter the waters of the state.” Section 644.016(6) RSMo

The water contaminant authorized to be discharged by this permit is urban stormwater runoff.

**Illicit Discharge:** “Any discharge to a municipal separate storm sewer that is not composed entirely of storm water, except discharges pursuant to a state operating permit, other than storm water discharge permits and discharges from fire fighting activities.” 10 CSR 20-6.200(1)(D)7.

**Infill development:** The building of homes, businesses and public facilities on unused and underutilized lands within existing urban areas. Infill development is the use of land in established neighborhoods for new development or redevelopment.

**Iterative process:** A documented process consisting of action items and analysis conducted by the MS4 Operator to ensure that BMPs are effective. This includes evaluating results and adjusting actions on the basis of what has been learned, as a part of adaptive management.

**Maximum Extent Practicable (MEP):** An adaptive management approach whereby the permittee will implement management measures, including structural and non-structural BMPs. MEP is a permittee-specific determination guided by factors such as: community financial capability and the need for reasonable rate or funding increases, weighing program-wide priorities compared to site-specific MS4 improvements, MS4 impacts to receiving waters, local priorities, watershed planning, integrated planning, MS4

size, climate, implementation schedules, hydrology, topography, geology, and the MS4's capacity to perform additional operation and maintenance.

**Minimum Control Measure (MCM):** The Phase II Rule defines a small MS4 stormwater management program as comprised of six areas of management, known as Minimum Control Measures. When administered properly and collectively, they are expected to result in reduction of the discharge of pollutants into receiving water bodies.

**Modification:** A revision to the MS4's Stormwater Management Program during the life of this permit. All modifications require written notification by the MS4 operator to the Department of Natural Resources (Department). Modifications may include:

- a. Addition of new components, controls, or requirements to the Stormwater Management Program;
- b. Replacing or modifying ineffective or unfeasible BMPs in accordance with adaptive management and the permittee's iterative process;
- c. Modifying the iterative process or adaptive management procedures;
- d. Replacing or modifying time schedules that are not explicitly required by this permit;
- e. The addition or removal of jurisdictional areas;
- f. Contact names for the Stormwater Management Program; and
- g. Other changes as determined appropriate by the MS4 Operator.

Major vs. Minor Modifications:

A **minor modification** does not need to be submitted to the Department for review and approval or to be public noticed.

A **major modification** requires submittal to the Department for review and approval and requires public notice.

**MS4 Operator:** "The owner, or an agent of the owner, of a separate storm sewer with responsibility for operating and maintaining the effectiveness of the system." 10 CSR 20-6.200(1)(D)17.

**Municipal Separate Storm Sewer (MS4):** "A municipal separate storm sewer system" 10 CSR 20-6.200(1)(D)11.

"Municipal separate storm sewer means a conveyance or system of conveyances including roads and highways with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, paved or unpaved channels, or storm drains designated and utilized for routing of storm water which—

- A. Does not include any waters of the state as defined in section 644.016, RSMo.
- B. Is owned and operated by the state, city, town, village, county, district, association, or other public body created by or pursuant to the laws of Missouri having jurisdiction over disposal of sewage, industrial waste, storm water, or other liquid wastes;
- C. Is not a part or portion of a combined sewer system;
- D. Is not a part of a publicly owned treatment works as defined in 40 CFR 122.2." 10 CSR 20-6.200(1)(D)16.

**Non-Structural Controls:** Pollution prevention practices that focus on management by limiting or eliminating pollutants before they mix with stormwater. Non-structural controls may include but are not limited to; site and land use planning, vegetated filters, stream buffers, low impact development (LID), open space preservation, and impervious cover restrictions.

**Outfall:** "A point source as defined by 10 CSR 20-2.010 at the point where a municipal separate storm sewer discharges and does not include open conveyances connecting two (2) municipal separate storm sewers, pipes, tunnels, or other conveyances which connect segments of waters of the state and are used to convey waters of the state." 10 CSR 20-6.200(1)(D)18.

Outfalls are the point of discharge from the MS4 to waters of the state. Outfalls include discharges from pipes, ditches, swales, and other points of concentrated flow. An outfall is not where a stream or waters of the state leave the municipal boundary.

**Owner:** "A person who owns and controls the use, operation, and maintenance of a separate storm sewer." 10 CSR 20-6.200(1)(D)20. "Person" is defined by Section 644.016(15) RSMo as "any individual, partnership, copartnership, firm, company, public or private corporation, association, joint stock company, trust, estate, political subdivision, or any agency, board, department, or bureau of the state or federal government, or any other legal entity whatever which is recognized by law as the subject of rights and duties."

**Permittee:** Refers to the MS4 Operator, or the entities identified as the owner and continuing authority of this general permit.

**Stormwater:** "[S]torm water runoff, snowmelt runoff and surface runoff, and drainage." 10 CSR 20-6.200(1)(D)31.

**Stormwater Management Program:** A comprehensive and documented program to manage the quality of stormwater discharges from the MS4.

**Stormwater Management Plan (SWMP):** The document explaining the MS4's Stormwater Program. It should be a comprehensive document that explains BMPs and the ongoing evaluation of the BMPs, as well as tracking, methods of documentation, and other procedures for each requirement of this permit. The MS4 Operator must utilize the procedures and other supplemental documents contained with or referenced in the SWMP during the activities performed to attain permit compliance.

In this comprehensive general permit, the SWMP details the specific BMPs, time schedules, and other details for the individual MS4 and community, and does not need to be reviewed for approval by the Department during the application process.

**Structural Controls:** Pollution prevention practices that require the construction, or use of a device, to capture or prevent pollution in stormwater runoff. Structural controls may include but are not limited to: extended detention basins, bio-retention, infiltration basins, stormwater wetlands, bio-swales, vegetative lined ditches, subsurface drains, permeable pavement or concrete, sand filter basins, stormwater planters, proprietary BMPs, storage tanks, and hydrodynamic separators.

**Urbanized Area (UA):** An area of densely developed territory as defined and used by the U.S. Census Bureau, that may include multiple MS4s. The Census Bureau delineates urbanized areas after each decennial census.

**Waters of the State:** “[A]ll waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or two or more persons jointly or as tenants in common.” Section 644.016(27) RSMo.

The definition of Waters of the State takes precedence when applying state regulations.

## **Part II – Receiving Stream Information**

### **Municipal Stormwater Outfalls:**

Applications for MS4 operating permit (renewal or new) require the MS4 to provide information regarding the location of outfalls from the regulated MS4. The NPDES MS4 operating permit covers all discharges from the permittee's stormwater system into waters of the state.

Outfalls listed under the Facility Description in the operating permit only include representative stormwater outfalls. Representative outfalls are outfalls that discharge to the primary stem of principal watercourses in separate sub-regional watersheds and are representative of various land uses. Representative outfalls are listed in the permit as a subset of ALL of the MS4's outfalls. Listing all MS4 stormwater outfalls could add several extra pages to the permit and would require the operating permit to be modified if any outfall changes were made. However, the permittee is required by the operating permit to maintain a map as part of their Stormwater Management Program of all stormwater outfalls that discharge to waters of the state.

Applications for renewal or to receive (i.e., new permit) of the MS4 general permit require the permittee to provide the legal description, outfall number and receiving stream. In addition, the application for both co-permittees and individual MS4 permittees require a United States Geological Survey map showing the locations of the municipality/area in relation to the local road system and to indicate on the map the municipal/area boundary, receiving stream(s), and the map section, township, and range.

From this information, Department permit writers will establish a full description of these permitted features on the permit's certification page with the following:

Permitted Feature ID (e.g., Outfall #001)

Legal Description: ¼, ¼, Section, Township, Range, Direction

UTM Coordinates: X=000000.0, Y=0000000.0 (Easting, Northing respectively)

Receiving Stream: Name & Classification

First Classified Stream and ID: Name, Class, Waterbody ID – currently provided by the department

USGS Basin & Sub-watershed No.: (# – #) [12 digit USGS Hydrologic Unit Code (HUC)]

### **Applicable Designations of Waters of the State:**

Per Missouri Effluent Regulations (10 CSR 20-7.015), the waters of the state are divided into seven (7) categories. This permit applies to facilities discharging to the following water body categories:

- Missouri or Mississippi River [10 CSR 20-7.015(2)]
- Lakes or Reservoirs [10 CSR 20-7.015(3)]
- Losing Streams [10 CSR 20-7.015(4)]
- Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- Special Streams [10 CSR 20-7.015(6)]
- All Other Waters [10 CSR 20-7.015(8)]

Missouri Water Quality Standards (10 CSR 20-7.031) defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1<sup>st</sup> classified receiving stream's beneficial water uses shall be maintained in accordance with 10 CSR 20-7.031(4). A general permit does not take into consideration site-specific conditions.

The Permit Area may change based upon areas incorporated into or removed from the permittee's jurisdictional area during the term of this permit, or expansion of the Urbanized Area (UA). Areas added shall be covered under this permit and reflected in the

Stormwater Management Program. For Permittees that are designated due to population density in a UA, which has areas that are not in the UA, the regulated MS4 is the portion which is inside of the UA.

The Department may require the regulated MS4 to submit an application for an alternate or additional general permit. Such as if the permittee is conducting regulated activities that are not covered under this permit but are addressed in a separate Master General Permit.

If the Department disapproves the application or SWMP and requires additional controls which add expenses, then the Department will conduct an affordability analysis in support of the disapproval for the application or SWMP. However, permittees may waive the requirement of the Department to conduct an affordability analysis at any time. If the permittee waives the affordability analysis, the Department shall assume all additional required controls are affordable.

### **Part III – Stormwater Management Program and Plan:**

#### **Stormwater Management Program**

This permit, in accordance with 10 CSR 20-6.200 and 40 CFR Part 122, requires the permittee to develop and implement a Stormwater Management Program. The Stormwater Management Program shall address the six minimum control measures; public education and outreach, public involvement/participation process, illicit discharge detection and elimination, construction site stormwater runoff control, post-construction stormwater management and pollution prevention/good housekeeping for municipal operations. In addition, the Stormwater Management Program addresses TMDL implementation plan components, if applicable.

The Stormwater Management Program also includes, but is not limited to, specific BMPs, relevant local regulations, policies, procedures, interim milestones, measurable goals, measures of success, designation of responsible persons/positions for each of the measurable goals, and any applicable TMDL assumptions and requirements.

#### **Stormwater Management Plan (SWMP)**

The SWMP is a documented implementation plan describing a schedule of MS4 program activities including prohibitions of practices, implementation of required practices, development of standards for urban growth, maintenance procedures, education, trainings, inspections, and other management practices to prevent or reduce the pollution of waters of the state.

For this comprehensive permit, a SWMP is required, it does not need to be submitted to the Department as part of the application. The SWMP shall lay out standard procedures and details of the Stormwater Management Program. This document will help ensure consistency and continuity in the Stormwater Management Program.

#### **SWMP Public Notice Procedure:**

The MS4 Remand Rule became effective on January 9, 2017 and requires public participation in the permitting process. The comprehensive permit lays out the requirements of the Stormwater Management Program, using the specific SWMP may make an effective method of explaining the Stormwater Management Program.

#### **Stormwater Management Program Ordinances:**

To the extent allowable under state or local law, ordinances (or other regulatory mechanisms if a non-traditional MS4) are required to be developed, implemented and enforced within five years of initial permit issuance under the following sections, in accordance with 40 CFR 122.34(b):

*Illicit discharge detection and elimination*; to prohibit non-stormwater discharges into the storm sewer system, and implement appropriate enforcement procedures and actions;

*Construction site stormwater runoff control*; to require erosion and sediment controls at construction sites, as well as sanctions designed to ensure compliance; and

*Post-construction*; to address post-construction runoff from new development and redevelopment projects, and sanctions designed to ensure compliance. The “Missouri Guide to Green Infrastructure: Integrating Water Quality into Municipal Stormwater Management” (May 2012) was written specifically to aid MS4s in developing and implementing the post-construction runoff program. The guide can be viewed at <https://dnr.mo.gov/document-search/missouri-guide-green-infrastructure-pub2446>. The EPA and the Department and certain MS4s have developed compliant model ordinances that may be adapted for use by other interested MS4s.

#### **Stormwater Management Program Reporting Frequency:**

The previous version of this operating permit required biennial reporting of the Stormwater Management Program for existing regulated MS4s; however, annual reporting will now be required for existing regulated MS4 permittees in accordance with 40 CFR 122.34(d)(3).

The annual reporting ensures the annual review of the MCMs and overall stormwater management program is being conducted as required in this permit. The annual requirement also ensures there is no further confusion regarding which year the biennial report was due. The annual submittal of the Stormwater Management Program Report is also consistent with the MS4 Operators who are subject to TMDLs that must submit annual water quality schedules.

The reports shall be reported electronically by the owner, operator, or the duly authorized representative of the MS4 to the Department via the eDMR system. This annual Stormwater Management Program Report can be used by the Department and the public to evaluate the quality and compliance of a MS4's program. A MS4 Operator may consider including additional information with the annual report to show the quality and comprehensiveness of the MS4 program. The report can be used to showcase an outstanding program.

Date	Item	Report submitted to Department
January 1, 2022	Updates to Stormwater Management Plan complete	No (unless requested by Department staff)
February 28, 2022	Annual Stormwater Management Program Report	yes
February 28, 2023	Annual Stormwater Management Program Report	yes
February 28, 2024	Annual Stormwater Management Program Report	yes
February 28, 2025	Annual Stormwater Management Program Report	yes
February 28, 2026	Annual Stormwater Management Program Report	yes

**Part IV - Rationale and Derivation of Effluent Limitations & Permit Conditions**

**Professional Best Judgement:**

The permit writer used professional best judgement as a high quality technical opinion developed by a permit writer after considerations of all reasonably available and pertinent data or information that forms the basis for the terms and conditions of a NPDES permit.

Previous versions of the MS4 Master General Permit followed federal regulations for the BMPs applicable to Phase II MS4s via the Minimum Control Measures (MCMs) under 40 CFR 122.34(b). BMPs are Technology-based Effluent Limits (TBELs), which then subjects the BMPs to case- by-case determinations using professional best judgement.

The Remand Rule was a non-substantive rule, requiring the permitting authority (the Department) to ensure permit requirements include narrative, numeric, or other types of requirements. Permit requirements that simply copy the language of the federal Phase II regulations without providing further detail on the level of effort required or that do not include the minimum actions that must be carried out during the permit term do not provide clear, specific, and measurable requirements. The permit writer used professional best judgement in deciding the clear, specific and measurable requirements for this permit.

**Comprehensive Category Grouping**

MS4 designation is based primarily off of population size. Because there is such diversity, even in Phase II MS4s the permit writer wanted to offer differing levels to help in areas where the population of the regulated MS4 impacts the BMPs the most. These groups are used to offer assistance to the smallest MS4s while ensuring the more populated MS4s are targeting the appropriate amount of target audiences and pollutants.

The designated groups only vary in MCM 1 BMPs in areas where target audiences and target pollutants are concerned. In researching audit reports and compliance assistance visits throughout the state certain challenges were seen facing the MS4s with the smallest populations. One noticeable challenge was the lack of variety in target audiences, this was similar to non-traditional MS4 that also have a limited population.

The number of MCM 1 BMPs were the lowest for these in Group A to reflect the lower amount of possible target audiences, the lower population to participate in events, and even the ability of their population to participate in events or behaviors targeted. Class 2 counties were also included in the Group A to reflect the smaller population size those counties. The MS4s in this group may not have industries in their boundaries. There are often no schools, or religious organizations.

The Group B MS4s have a larger population, which will reflect in the number of potential target audiences. The population size ranges from 10,000 to reflect the designation of population of 10,000 for a municipality outside urbanized areas. The MS4s in this group are also joined by Class 1 counties, which have larger populations. These Group B MS4 will have more sub-groups in their population to target. MS4s of this size will have industries, educational institutions, and other potential target audiences.

The Group C MS4s are the largest of the Phase II MS4s. The Census Bureau identifies an Urbanized Area (UA) as an area meeting the minimum population density requirement, with a population of over 50,000. Missouri has three large UAs; Kansas City, St. Louis, and Springfield. Additionally, as of the 2010 census, there are four other UAs in Missouri. Each of those individual municipalities has a high enough population to have the name designation of an UA. So while the area in that population density must meet 50,000 population as a whole, the main municipality will carry the majority of that population. The population of 40,000 was established as the bottom level for Group C to capture the larger municipalities in these UAs. MS4s of this size will have a variety of industries,

educational institutions, and residents to draw from. They will also have a variety of potential pollutants or sources of pollution to target.

### **Integrated Planning**

As noted in the June 5, 2012 EPA memorandum, “*Integrated Municipal Stormwater and Wastewater Planning Approach Framework*” EPA has increasingly embraced integrated planning approaches to municipal wastewater and stormwater management. EPA further committed to work with states and communities to implement and utilize these approaches in its October 27, 2011 memorandum “*Achieving Water Quality through Municipal Stormwater and Wastewater Plans.*”

Integrated planning assist MS4 communities on their critical paths to achieving the human health and water quality objectives of the Clean Water Act by identifying efficiencies in implementing requirements that arise from distinct wastewater and stormwater programs, including how best to prioritize capital investments. Integrated planning can also facilitate the use of sustainable and comprehensive solutions, including green infrastructure, that protect human health, improve water quality, manage stormwater as a resource, and support other economic benefits and quality of life attributes that enhance the vitality of communities.

For more information regarding integrated planning please review both of the memorandums cited above or contact the Department’s MS4 Team.

### **Maximum Extent Practicable (MEP)**

Prior to 1987, municipal stormwater was subject to the same controls as other point sources like industrial and domestic discharges, which was section 301(b) of the CWA. However, in 1987, “Congress retained the existing, stricter controls for industrial stormwater discharges but prescribed new controls for municipal stormwater discharges,” *NRDC v. EPA*, 966 f.2d 1292, 9<sup>th</sup> Cir. 1992 (*NRDC v. EPA*). This “new control” was established in section 402(p)(3)(B)(iii) of the CWA, which states, “*Permits for discharges from municipal storm sewers – shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, designs and engineering methods, and such other provisions as the Administrator or State determines appropriate for the controls of such pollutants.*”

The argument for “new controls” contained in the case of *NRDC v. EPA* was subsequently supported in the case of *Defenders of Wildlife v. Browner*, in which it was concluded that section 402(p)(3)(B) of the CWA “replaces” the requirements of 301( b) of the CWA with the MEP standard for MS4 discharges, and that it creates a “lesser standard” than section 301(b) of the CWA establishes on other types of discharges. Thus, MEP is a technology-based standard established by Congress in Section 402(p)(3)(B)(iii) of the CWA. As established in the *1999 National Pollution Discharge Elimination System Regulations for Revisions of Water Pollution Control Program Addressing Storm Water Discharges* (64 FR No. 235), MEP is, “...the statutory standard that establishes the level of pollutant reduction that operators of regulated MS4s must achieve,” (i.e., not water quality standards).

In addition to indicating that MEP is the statutory requirement, the EPA also clearly stated that MEP is applicable to the six (6) minimum controls measures in 64 FR No. 235, which states, “*The first component, reduction to the MEP, would be realized through implementation of the six minimum measures.*” The description of MEP continues in 64 FR No. 235, with “*EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards.*” The iterative process, mentioned is also defined in 644 FR. No 235 with the following, “...implement an iterative process of using BMPs, assessment, and refocused BMPs, leading toward the attainment of water quality standards.”

Ninth Circuit court ruling in *EDC v. EPA* (2003) found that the Phase II rule requirements for small MS4 General Permits violated the CWA. The court ruling found a lack of permitting authority review and lack of public participation in permit process. The MS4 Remand Rule was promulgated December 9, 2016 and became effective on January 9, 2017 as a result of this ruling. The Remand Rule requires more stringent public notice requirements and authorization requirements, including SWMP review, approval, and incorporation for two-step general permits. There is not review, approval or incorporation for this Comprehensive permit.

The Remand Rule ensures permit requirements include narrative, numeric, or other types of requirements such as:

- Implementation of specific tasks or best management practices (BMPs)
- BMP design requirements, performance requirements
- Adaptive management requirements
- Schedules for implementation and maintenance
- Frequency of actions.

All requirements in this permit must be expressed in clear, specific, and measurable terms. This applies to any part of the permit addressing the six MCMs, TMDLs, and Stormwater Management Program Reports. MCMs were not intended to serve as stand-alone permit requirements, but rather areas of stormwater management that must be addressed in the permit through clear, specific, and measurable terms and conditions that meet the MS4 permit standard. Verbatim adoption of the MCMs from the Federal regulations will not satisfy this requirement.

**Measurable Goals**

Measurable goals are designed objectives or goals that quantify the progress of program implementation and performance of BMPs. They are objective markers or milestones that the permittee uses to track the progress and effectiveness of BMPs in reducing pollutants to the MEP. At a minimum, measurable goal should contain descriptions of actions that will be taken to implement each BMP, what is anticipated to be achieved by each goal, and the frequency and dates for such actions to be taken. BMPs and measurable goals are the mechanisms used to establish a clear and specific baseline against which future progress at reducing pollutants to the MEP can be measured.

There are a number of different ways the permittee can establish measurable goals. Examples of potential measurable goals include the following:

- **Tracking implementation over time** - Where a BMP is continually implemented over the permit term, a measurable goal can be developed to track how often, or where, this BMP is implemented.
- **Measuring progress in implementing the BMP** - Some BMPs are developed over time; a measurable goal can be used to track this progress until the BMP implementation is completed.
- **Tracking total numbers of BMPs implemented** - Measurable goals can be used to track BMP implementation numerically (e.g., the number of wet detention basins in place or the number of people changing their behavior due to the receipt of educational materials).
- **Tracking program/BMP effectiveness** - Measurable goals can be developed to evaluate BMP effectiveness, for example, by evaluating a structural BMP's effectiveness at reducing pollutant loading, or evaluating a public education campaign's effectiveness at reaching and informing the target audience to determine whether it reduces pollutants to the MEP. A measurable goal can also be a BMP design objective or performance standard.
- **Tracking environmental improvement** - The ultimate goal of the NPDES stormwater program is environmental improvement, which can be a measurable goal. Achievement of environmental improvement can be assessed and documented by ascertaining whether state water quality standards are being attained, or by tracking trends or improvements in water quality (chemical, physical, and biological) and other indicators, such as the hydraulics or habitat condition of the waterbody or watershed.

Because of changes due to the MS4 Remand Rule, measurable goals are specifically laid out in this permit. The MS4 Remand Rule emphasizes that permit requirements must be expressed in “clear, specific, and measurable” terms, which may include narrative, numeric, or other types of requirements (e.g., implementation of specific tasks or best management practices (BMPs), BMP design requirements, performance requirements, adaptive management requirements, schedules for implementation and maintenance, and frequency of actions). These rule modifications do not alter the existing, substantive requirements of the six minimum control measures in 40 CFR 122.34(b).

Examples of measurable goals in this MOR04C (this is not a complete chart of all measurable goals in this permit):

MCM	Requirement	Group A	Group B	Group C	Co-permittee adjustment	Newly designated differences	Reference
1	Target audiences	Residents	Residents; plus 1 throughout permit cycle	Residents; plus 2 throughout permit cycle			Table I 4.1.A
1	Target pollutants	1 per audience	1 per audience	1 per audience			Table II 4.1.B
1	BMPs (outreach material or action)	2 per permit cycle	4 per permit cycle	5 per permit cycle			Table III 4.1.C
1	Participation	1 per permit cycle	2 per permit cycle	3 per permit cycle	1 in boundary of each co-permittee		Table IV 4.1.D
2	Public Notice	30 days	30 days	30 days			4.2.A
2	Public Meeting	30 day advertised	30 day advertised	30 day advertised			4.2.C
2	Update governing board	1 time annually	1 time annually	1 time annually			4.2.F
3	Outfall map	All outfalls, receiving water, boundary or MS4	All outfalls, receiving water, boundary or MS4	All outfalls, receiving water, boundary or MS4		Complete by end of first 5 years	4.3.A
3	Dry weather outfall screening	60% per permit cycle	60% per permit cycle	60% per permit cycle		Locate & screen all in first 5 years	4.3.D
3	Identify priority areas	Identify and evaluate annually	Identify and evaluate annually	Identify and evaluate annually	Each shall identify areas		4.3.H
4	Pre Construction plan reviews	Each land disturbance site	Each land disturbance site	Each land disturbance site			4.4.B



4	Inspection program	Each land disturbance site	Each land disturbance site	Each land disturbance site			4.4.C
4	Construction site operator inspection requirements	Each land disturbance site	Each land disturbance site	Each land disturbance site			4.4.E
5	Water Quality post-construction BMP standards	Standards for structural controls and non-structural controls	Standards for structural controls and non-structural controls	Standards for structural controls and non-structural controls			4.5.B
5	Pre Construction plan reviews	Each land disturbance site	Each land disturbance site	Each land disturbance site			4.5.C
5	Long term operations and maintenance agreements	All new post-construction water quality BMPs	All new post-construction water quality BMPs	All new post-construction water quality BMPs			4.5.D
5	Water Quality post-construction BMP inspection	60% per permit cycle	60% per permit cycle	60% per permit cycle			4.5.E
6	Training	1 time annually	1 time annually	1 time annually			4.6.A - 4.6.C
6	List of MS4 owned/operated NPDES facilities	Continuous, update annually	Continuous, update annually	Continuous, update annually			4.6.D
6	On site pollutant controls	Continuous, update annually	Continuous, update annually	Continuous, update annually			4.6.F
6	Washing (vehicles and equipment) procedures	Continuous	Continuous, update annually	Continuous, update annually			4.6.H

**Modifications**

Minor modifications to BMPs or implementation may be allowed under this Comprehensive General Permit, if the changes do not alter the permit requirements.

*As an example, the MS4 permit requires tracking for construction sites including plan reviews, inspections, and enforcement actions. The MS4 Operator used a central excel sheet, but now has the ability to purchase software that will store checklists for each step. This is considered an alteration in a BMP and is not a major modification as the permit requirement is still in effect.*

**Minimum Control Measures (MCMs)**

The NPDES Permitting authority must include permit terms and conditions to reduce the discharge of pollutants from the MS4 to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. Terms and conditions that satisfy the requirements of this section must be expressed in clear, specific, and measurable terms. Such terms and conditions may include narrative, numeric, or other types of requirements (e.g., implementation of specific tasks or best management practices (BMPs), BMP design requirements, performance requirements, adaptive management requirements, schedules for implementation and maintenance, and frequency of actions) per 40 CFR 122.34(a).

In general, the Phase II MCMs as described in the federal regulation are not intended to serve as permit requirements, but rather areas of stormwater management that must be addressed in the permit through clear, specific, and measurable terms and conditions. Relying on the literal adoption of the MCMs from the federal regulations will not meet the requirement to establish clear, specific, and measurable permit requirements under the MS4 remand rule.

*MCM 1 Public Education and Outreach on Stormwater Impacts*

Terms and conditions related to this MCM are in accordance with 40 CFR 122.34(b)(1).

Public education and outreach is vital, as an informed and knowledgeable community is central to the success of a stormwater management program. Everyone has a part to play in both contributing to stormwater runoff and protecting water quality.

The MS4 Operator has the flexibility to choose which target audiences make sense for their MS4. The MS4 Operator can choose the audience, the medium, and the specific message. By educating the residents, the MS4 can help ensure greater support for stormwater management measures, and the public gains a greater understanding of the reasons why stormwater management programs are necessary and important. Public support is extremely beneficial for MS4 operators to institute new funding initiatives for the stormwater program or in seeking support or volunteers to help implement the program.

Education to schools or youth will reach the next generation of residents, and they can bring their lessons home. Businesses of all types have potential to impact urban stormwater. Retail, restaurants, manufacturing, even home based businesses bring their own potential issues. Plastic bags, litter, grease disposal, open garbage containers, and improper disposal methods should be evaluated and be seen as educational opportunities. Formal organizations such as Rotary Clubs, Lions, Churches, sports teams, or college organizations, can support the messages and provide audiences ready to listen, learn, and even help. In MS4s where development is happening, or being encouraged, educating developers is a great way to get in front of issues, and improve compliance with MCM #4.

The MS4 can target the education provided to specific groups. In educating Homeowner Associations (HOAs), for example, pollutants specific to them, such as fertilizer usage, car washing practices, stream buffers, and proper disposal of organic and household hazardous waste can be reviewed and specific BMPs and guidance provided to the HOAs to manage these pollutant sources. This audience can also be informed on maintenance of post-construction water quality facilities or ways they as homeowners can improve the quality of stormwater runoff. Another specific group that may be addressed is industrial facilities. Industrial facilities will bring potential new issues with the products or the production processes. Looking at each facility, and offering education based on the stormwater concerns, can reduce the pollutants in the runoff and diminish larger issues in the future.

Some MS4s may have a valid reason to include another target audience to their education program. If an area has a high level of tourist this may be a good target. If the area is retrofitting basins, the neighboring homeowners may be a target audience. It is part of the Missouri Nutrient Loss Reduction Strategy to enhance public involvement and education of nutrients in urban stormwater runoff. Residents can learn practical ways to decrease nutrients into the stormwater. Educating people on ways they can make an impact on a bigger picture can cause small changes which will add up. Focusing on trash is a way to show MS4 audiences the problem with a very visible media. By seeing how litter travels in the stormwater, it is easier to understand how smaller pollutants, such as oils, heavy metals, nutrients, or bacteria travel through the stormwater.

Tracking is important to ensure the target audiences are getting the information about the targeted pollutants. Many MS4 programs will see cycles of when education for certain topics is needed more than other topics. Learning through tracking and adaptive management will help the MS4 get effective education to the audiences.

Encouraging multiple stakeholder groups to become involved in the Stormwater Management Program will help foster a greater understanding of urban stormwater runoff and the potential impacts that can come from daily life in an urban setting. Because impacts are made in stormwater at businesses, and at home, it is vital to reach as many different groups as possible. Making the topic of stormwater management a relatable issue will help to get the message across, and give the recipients more reason to make changes.

When people participate in an activity, the underlying message becomes more tangible, and their personal impact has a stronger tie to the message. There are many ways to get people involved, and these ways will ideally reach different groups. Communities may already have philanthropic organizations willing to assist the permittee with activities. The Missouri Stream Team program is available state wide and engages in most of the activities listed in Part 4.2 of this permit. Learn more at [mostreamteam.org](http://mostreamteam.org) or contact [StreamTeam@mdc.mo.gov](mailto:StreamTeam@mdc.mo.gov).

The MS4 Operator shall offer support of their own in conjunction with or to organizations helping with participation activities. There are a variety ways to offer support to groups who plan or organize events. By engaging with the groups or individuals creating these participation opportunities, the MS4 Operator can find ways to help in a manner which fits them, and really impacts the activities positively.

Co-permittees may gain a lot by sharing resources for much of the Stormwater Management Program. However, a part of the participation element is having the connection between behavior and action. It is important to have events located in the area of each MS4 in a co-permit to gain ownership and accountability in the local stormwater management program. A visible activity in a physical or geographic area will impact those in that same area, which is a large part of what makes this MCM work.

In working to establish a specific minimum of BMPs, the permit writer used professional best judgment. In looking at a calendar year, there are three seasons which are conducive to outdoor activities. Likewise the calendar could be seen as quarters, or as a traditional school year plus summer break. Tracking is important to ensure the target audiences are getting the information about the targeted pollutants. Many MS4 programs will see cycles when education is more needed for certain topics, such as seasonal changes, or a re-education on a topic after a few years to remind the audience. Learning through tracking and adaptive management will help the MS4 get effective education to the audiences.

Recording elements such as the number of participants, the amount of litter collected, trees planted, or audience attending will help the MS4 Operator understand if the activity was useful or not. Attendance sheets, receipts, Stream Team Activity Reports, or a spreadsheet can be used to keep track of events and results. Sometimes events may be less attended than anticipated, but the MS4 Operator should consider that even a small impact is still an impact. When using adaptive management properly, adjustments can be made and the activity can be repeated.

#### *MCM 2 Public Participation*

This MCM is required in accordance with 40 CFR 122.34(b)(2).

The Stormwater Management Program shall use the same procedure as the Master General Permit because the Management Program is the part that is specific to the MS4 it was created for. Following the public notice processes laid out in Part 4.2 of this permit will give the public the opportunity to comment on or learn about the Stormwater Management Program.

The MS4 Operator does not need to create a stormwater management panel or committee. Having such a panel or committee will give

the MS4 Operator a more immediate way of getting public representation involved and getting feedback from the public. A board with a diverse membership can enhance a stormwater management program by getting multiple viewpoints. Involving so much feedback and input will help gain backing from the residents and this understanding of the program will garner support when needed.

Giving updates on the Stormwater Management Program to the governing body or board can help the decision makers understand the reasons behind the processes and the benefit a healthy stormwater management can have on the economic value to their area. This update can be an opportunity to show successes in the program, and may be done in conjunction with preparing the Stormwater Management Program Report. These updates may be given as an in person presentation, as a written document, or via another method that will get the message effectively to the board.

### *MCM 3 Illicit Discharge Detection and Elimination (IDDE)*

This MCM is required in accordance with 40 CFR 122.34(b)(3).

An outfall is any point where a separate storm sewer system discharges to waters of the state, which is owned or operated by the permittee. Outfalls include discharges from stormwater conveyances such as pipes, ditches, swales, gutters, and other points of concentrated flow.

An outfall does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances that connect segments of the same stream or other waters of the state and are used to convey waters of the state (such as culverts). If waters of the state flow through a channelized area, this remains waters of the state, not an open conveyance.

Outfalls are not where streams leave the municipal boundaries of an MS4. Outfalls are not limited by size, as illicit discharge can travel through any size outfalls, even those that are small. While larger outfalls may collect more drainage from a larger area, small outfalls were also constructed to convey stormwater and are equally likely to have illicit discharges. Overland flows, or areas of non-concentrated or sheet flow, are not considered to be outfalls. Therefore they are not required to be mapped. Where a conveyance ends and discharges to a BMP, such as a vegetated area, and there is no conveyance to waters of the state, the conveyance end is not an outfall if the discharge does not reach waters of the state.

Mapping all MS4 outfalls is vital to a functioning illicit discharge program. Outfalls mapping gives the MS4 Operator a starting point to trace back to the source. Knowing the locations of outfalls and receiving waters are necessary to be able to conduct dry weather field screening for non-stormwater flows and to respond to illicit discharge reports from the public. Outfalls must be mapped no matter their size.

Mapping the storm sewer system which leads to those outfalls will further assist in illicit discharge tracing. Once an illicit discharge is detected at an outfall, it will be necessary to trace the discharge through that portion of the storm sewer system leading to the outfall in order to locate the source.

Because privately owned storm sewers and conveyances were authorized by a municipality or the county to become connected with the municipal system, the municipality or county with the MS4 permit does have responsibility for that stormwater. Facilities owned by homeowners associations, for example, are subject to local codes, ordinances, and enforcement. The municipalities are responsible, therefore, for discharges of wastes from private stormwater conveyance systems. Therefore enforcement actions shall take place if an illicit discharge is detected from a private outfall. So while the outfalls from such private stormwater conveyances and outfall are not required for mapping, it is recommended to do so in order to assist with illicit discharge investigations and enforcement.

Ongoing dry weather field screening for non-stormwater flows is a strong tool for detecting illicit discharges. This process will verify outfall locations by walking, wading or even using a boat in the streams or along the streambanks and shorelines. Evidence of past non-stormwater flows, trash, improper yard waste disposal, along with the structural integrity of the storm sewer system can be found.

The field screenings are important in relation to priority areas. The field screening may identify new priority areas (problems areas) or the MS4 Operator may conduct more frequent screenings in the priority areas. When considering where priority areas are, look at land use on the watershed. Priority areas may be industrial areas, areas with a concentration of food establishments with grease disposal, or parts of the city with older infrastructure which may have cross contamination from aged domestic sewers, or an area of retail where litter may be an issue. The MS4 Operator should consider all types of pollutants when determining priority areas.

Investigating pollutants may involve sampling for the following parameters: specific conductivity, chloride, ammonia, nitrates, potassium, surfactant and/or fluorescence concentration, pH, *E. coli* and other chemicals indicative of suspected sources. Useful observations of any physical characteristics of the discharge include: flow rate, temperature, odor, color, turbidity, floatable matter, deposits, stains, and impacts to vegetation or wildlife.

The MS4 Operator does not need to have the sample analyzation equipment, they must at minimum maintain a contract lab relationship so the samples can be taken and analyzed. For guidance on illicit discharge investigations, and parameters to sample for see: [https://www.epa.gov/sites/production/files/2015-11/documents/sw\\_idde\\_pittbacklit.pdf](https://www.epa.gov/sites/production/files/2015-11/documents/sw_idde_pittbacklit.pdf)  
Or [https://stormwater.pca.state.mn.us/images/b/b2/Final\\_IDDE\\_Field\\_Guide\\_HRPDC.pdf](https://stormwater.pca.state.mn.us/images/b/b2/Final_IDDE_Field_Guide_HRPDC.pdf)

The program must include procedures for tracing the source of an illicit discharge. Once an illicit discharge is detected and field tests have provided source characteristics, the next step is to determine the location of the pollutant source. The map of the storm sewer system is a valuable tool, and is most often the first step in this plan. Techniques for tracing the discharge to its place of origin may include: following the flow up the storm drainage system via observations and/or chemical testing in manholes or in open channels, televising storm sewers, using infrared and thermal photography, conducting smoke or dye tests.

Education efforts in resolving the problem should occur before taking legal action; however, the MS4 needs to have the ability to enforce the IDDE plan. The procedures for removing the source of the illicit discharge will vary depending on the source of the discharge. The plan may include notifying the property owner and specifying a time for the owner to eliminate the discharge. Additional notifications and escalating legal actions, if needed, should also be described in this part of the plan. The MS4 Operators should consider creating an enforcement response plan, including the ability to collect cleanup and abatement costs from the responsible party. The MS4 Operator should also maintain contacts for environmental cleanup and environmental emergency response.

Per 260.505 RSMo, any emergency involving a hazardous substance must be reported to the Department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The Department may require the submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply when the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. <https://dnr.mo.gov/waste-recycling/investigations-cleanups/environmental-emergency-response>.

Each MS4 will need to determine their own priority areas. However, if an area receives three complaints or reports of separate events within a six month range, the MS4 must prioritize this area until the source is determined.

The MS4 Operator must have procedures for responding to reports of illicit discharges. Actions taken under the illicit discharge program should be documented. The MS4 Operator must use tracking to show progress is being made to eliminate illicit connections and discharges.

Illicit discharges may originate in one MS4 jurisdiction and cross into another MS4 jurisdiction before being discharged at an outfall. The MS4 that detects the illicit flow is expected to trace it to the point where it leaves their jurisdiction and notify the adjoining MS4 of the flow, and any other physical or chemical information. The adjoining MS4 shall then trace it to the source or to the location where it enters their jurisdiction. The process of notifying the adjoining MS4 should continue until the source is located and eliminated.

#### *MCM 4 Construction Site Runoff Control*

This MCM is required in accordance with 40 CFR 122.34(b)(4).

Polluted stormwater runoff from construction sites often flows to MS4 storm sewers and is ultimately discharged into local waterbodies. Of the pollutants that have the potential to be discharged, sediment is usually the main pollutant of concern. According to the 2000 National Water Quality Inventory, States and Tribes report sediment as one of the most widespread pollutants affecting assessed rivers and streams, second only to pathogens (bacteria). Sources of sediment include agriculture, urban runoff, construction and forestry. However, sediment runoff rates from construction sites are typically 10 to 20 times greater than those of agricultural lands and 1,000 to 2,000 times greater than those from forest lands.

During a short time period, construction sites can contribute more sediment to streams than can be deposited naturally during several decades. The resulting siltation and contribution of other pollutants from construction sites can cause physical, chemical, and biological harm to Missouri's waters.

The MS4 Operator must establish a construction program that controls polluted runoff from construction sites with a land disturbance of greater than or equal to one acre. There must be control through ordinances and/or other regulatory mechanism, such as a permit for land disturbance or grading activity.

Site Plan Review ensures the implementation of appropriate BMPs on construction sites to control erosion and sediment along with litter and other wastes at the site. To determine if a construction site is in compliance with such provisions, the MS4 operator can review the site plans submitted by the construction site before ground is broken. Plan reviews can aid in compliance and enforcement efforts since they alert the MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities. Reviewing non-structural BMPs first shall help make sure a more appropriate order of operation is being maintained. This may prevent actions such as removing trees only to install a permanent structural BMP which has the same effect as the removed trees. The structural BMPs may also reduce the quantity of runoff, which will have an influence on any permanent structural BMP.

Land disturbance activities, such as clearing and grading the land surface, increases the potential for sediment discharges. Clearing reduces the natural uptake of water and nutrients by vegetation and excessive grading can smooth the ground surface, increasing amount and velocity of runoff. Vegetation inhibits erosion as the roots hold the topsoil in place, while leaves protect the surface against rain. Once the vegetative cover is gone, erosion is accelerated. The longer the exposed area is subject to erosive forces, the more severe the effect.

The goal for this land disturbance program, should be to expose the smallest practical area of land, for the shortest possible time, to eroding forces. Phased construction minimizes the amount of land exposed at one time.

When the site becomes active, BMPs must be in place and the permittee inspection and enforcement activities must begin. To ensure that the BMPs are properly installed, the permittee is required to develop procedures for site inspection and enforcement of control measures to deter infractions. Procedures include steps to identify priority sites for inspection and enforcement based on the nature and extent of the construction activity, topography, the characteristics of soil and the receiving water body's quality. Inspections give MS4s an opportunity to provide additional guidance and education, issue warnings, or assess penalties.

Each site shall self-inspect to ensure their compliance with the regulations of both the MS4 and the State of Missouri Clean Water Law. An MS4 may require the site operator submit their self-inspection reports to the MS4 Operator as a form of oversight, tracking of compliance, or issues with the site. For consistency the requirements mirror the requirements of the current Missouri State Land Disturbance permit.

To fully ensure compliance the MS4 Operator must conduct oversight inspections as well. The MS4 Operator may choose to contract out these inspections to qualified inspectors, or consultants. If choosing this option, the MS4 Operator must make it clear to the site operators that the inspections are being conducted on behalf of the MS4. The oversight inspections must be conducted at a frequency which ensures compliance, but not so often that the site operator can use the MS4 oversight inspections as their own inspections. Too frequent oversight inspections may cause the inspector to become complacent or too familiar with the site or the personnel. Inspections can be used as educational opportunities from the inspector to the site operator.

Plan reviews before construction begins will help to identify priority site based off of site characteristics. Past inspections and the tracking of compliance issues may also assist in this identification if there have been issues with particular construction site operators or neighbors in the area of a site. Final inspections performed after the completion of the land disturbance project, ensure the site is properly stabilized, clean of solid waste and temporary BMPs. Terminating the Missouri Land Disturbance permit will reduce the number of NPDES permits open in that MS4 service area. Documenting inspections, such as with a checklist, will be evidence that the inspections are being conducting, ensure thoroughness and uniformity for the inspector. These documents be used to show the site operators that the inspectors are being consistent between sites.

MS4 staff must have enforcement tools available if they observe noncompliance with the MS4 regulatory mechanisms. The tools available may be notices of violation, stop work orders, or withholding of funds. These tools and mechanisms, and how to use them, should be described in the SWMP. The SWMP should also list who can use the enforcement tools, enforcement follow-up actions, such as follow-up inspections; how and when enforcement is escalated if the violation isn't corrected, and documentation requirements.

Having an inventory of all sites with relevant contact information and project information ensures the MS4 Operator is aware of the projects in their area. The tracking of sites is useful not only for the MS4 Operator's recordkeeping and reporting purposes, but also for members of the public interested in ensuring that sites are in compliance.

MCM 4 also includes a requirement to allow the public to report concerns they have regarding construction sites and water quality impacts. An educated public is more aware of sediment runoff as a pollutant, therefore this may be reflected in the amount of reports of water quality impacts and improper site management increasing. Conversely, as education for the developer increases, the amount of reports on these things may decrease. It should also be noted that while erosion and sediment regulations are typically focused on sediment, MCM 4 is not limited to just sediment. MS4 Operators must enforce construction sites for other types of waste, such as litter or concrete washout.

Many MS4s use existing code or building inspectors to also look at the sediment and erosion aspects of a site. These inspectors must have training, and must understand why the sediment and erosion inspections are of value. The permit writer understands that not all MS4s are able to afford extra training for inspectors, however there are free resources available. Because of the great impact, even one mismanaged construction site can cause a stream to be damaged. The effort and time to establish these training resources to create a training program are necessary to have competent inspectors.

Educating the individual site operators will add more awareness for how to manage sediment and erosion on a site, and why this is important. More information on the Missouri land disturbance permit is found at: <https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/stormwater/construction-land-disturbance>.



### *MCM 5 Post-Construction Runoff Control*

This MCM is required in accordance with 40 CFR 122.34(b)(5).

If water quality impacts are considered from the beginning stages of a project, new development and redevelopment provide more opportunities for water quality protection. Post-construction stormwater management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly affect receiving waterbodies. Many studies indicate that prior planning and design for minimization of pollutants in post-construction stormwater discharges is the most cost-effective approach to stormwater quality management.

The Phase II rule applies to redevelopment projects that alter the footprint of an existing site or building in such a way that there is a disturbance of equal to or greater than one acre of land. This program requires ordinances, or policies, that address stormwater runoff quality. Post-construction stormwater management can be utilized in ways that preserve and protect in a non-structural way, and in structural items that are used to mitigate the decreased water quality in the stormwater runoff. Because structural and non-structural practices work together, a minimum of one ordinance is required for structural controls and one ordinance for non-structural controls.

Structural controls have traditionally been concrete or “gray” infrastructure created to quickly move the stormwater away from the place it falls. These have caused increased erosion and water quality degradation to the receiving streams. Current standards include water quality as a factor in design, and many standards are actually based on natural systems and rely upon vegetation and soil mechanisms in order to perform as intended. The choice of which structural BMPs are most appropriate comes not as a post-construction fix, but rather as a result of the site design review, which should also look at the stormwater management of the site comprehensively.

Numeric, or technical, performance standards are broken into two types for stormwater discharges, a treatment standard or a volume-based/retention standard. Treatment standards typically specify an amount of pollutant to be managed, for example 80% TSS removal. Volume-based or retention standards typically require the use of infiltration, evapotranspiration or harvest practices to control a specified volume of stormwater onsite and are usually expressed as a volume of rainfall, a percentile storm event or a groundwater recharge volume.

Non-structural controls focus on preserving open space, protecting natural systems, and incorporating existing landscape features such as wetlands and stream corridors into a site plan to manage stormwater at its source. There is also emphasis on clustering and concentrating development, minimizing disturbed areas, and reducing the size of impervious areas.

Both structural and non-structural controls consider comprehensive stormwater management items such as:

- Stormwater should be managed as a resource
- Natural features and systems should be preserved and utilized
- Stormwater should be managed as close to the source as possible
- The hydrologic balance of surface and ground water should be maintained
- Runoff should be slowed down
- Potential water quality and quantity problems should be prevented
- Problems that cannot be avoided should be minimized
- Stormwater management should be integrated into the initial site design process.

The Department has created the Missouri Guide to Green Infrastructure, Integrating Water Quality into Municipal Stormwater Management for guidance; <https://dnr.mo.gov/document-search/missouri-guide-green-infrastructure-pub2446>.

Other guidance and model ordinances may be found at the following:

<https://www.epa.gov/nps/urban-runoff-model-ordinances-post-construction-controls>

<https://www.epa.gov/nps/urban-runoff-model-ordinances-aquatic-buffers>

<https://www.epa.gov/nps/urban-runoff-model-ordinances-open-space-development>

[https://www3.epa.gov/npdes/pubs/sw\\_ms4\\_compendium.pdf](https://www3.epa.gov/npdes/pubs/sw_ms4_compendium.pdf)

[https://www.epa.gov/sites/production/files/2015-09/documents/urban\\_ch05.pdf](https://www.epa.gov/sites/production/files/2015-09/documents/urban_ch05.pdf)

<https://www.epa.gov/green-infrastructure>

<https://www.cwp.org/reducing-stormwater-runoff/>

The MS4 Operator must ensure adequate long-term operation and maintenance of post-construction BMPs. This is accomplished through agreements between the MS4 Operator and land owners or regional authorities. Tying a structural control to the land deed may be adequate for some MS4s. If the agreement is recorded with local land records, any successive owner of the property would take the responsibilities of the operations and maintenance of that structural control in the agreement.

Both structural controls and non-structural controls, must be tracked and inspected. An inspection program must be established to ensure the stormwater controls are working and being properly maintained.

Non-structural controls must also be reevaluated. If an urban growth area was identified, it must be evaluated to ensure is room for more development, or if a new growth area should be found. If open spaces or sensitive areas are protected by ordinances or similar mechanism, these places should be inspected to ensure there is no encroachment of development or by neighboring properties. If impervious areas were minimized, these places should be inspected to ensure no additional impervious areas were added.

Educating MS4 on post-constructions BMPs will ensure the inspections are effective. There are free resources available online such as: <https://www.youtube.com/watch?v=SM9sI9wQgz0&feature=youtu.be>

As the public becomes more educated on post-construction stormwater runoff BMPs and controls, they may have more concerns to report. Through education however, there may be ways an MS4 can also gain participation to assist with maintenance issues, and to also further education on water quality and stormwater management.

#### *MCM 6 Pollution Prevention/Good Housekeeping*

This MCM is required in accordance with 40 CFR 122.34(b)(6).

The MS4 Operator's actions, and facilities are the example for the residents of that MS4. Leading by example can be an important component of education.

Training shall be given to any staff that have influence on stormwater for the MS4, not just environmental coordinators. By only focusing the training on a few members, the message will not get out. Each MS4 should take a realistic look at each department, division, and individual. If their work may either negatively impact or positively impact stormwater runoff, they must attend the training.

Training may be broken down into topics and dispersed throughout the year. It may be given in conjunction with other training. There are free resources available online such as;

[https://stormwater.pca.state.mn.us/index.php?title=Employee\\_training](https://stormwater.pca.state.mn.us/index.php?title=Employee_training)

<https://www.youtube.com/watch?v=UxOam2GEVgQ>

<https://www.youtube.com/watch?v=16ubsys6AZY>

While emergency firefighting actives are an authorized non-stormwater discharge, other actives related to a fire department, such as washing of trucks, run-off water from training activities, test water from fire suppression systems, and hydrant pressure testing, are not.

Live and simulated fire training should be conducted at facilities that have been built and engineered specifically for training exercises. These facilities should have run-off controls or BMPs to prevent discharging this water or foam used in training exercises. Any water used during training activities is considered wastewater and will require a separate permit (or de minimis determination) from the Department for discharge or land application. Water that is collected and conveyed to a wastewater treatment facility is not required to obtain a separate permit.

If firefighter training cannot be conducted at a specially designed facility, additional pollution prevention actions will need to be taken before training begins in order to prevent illicit discharges. Additional actions may include; sweeping prior to and after training; blocking off all potentially affected stormwater structures; directing to a sanitary sewer line; if spraying water over a landscape, arch the water so that velocities are dissipated and there is less chance of soil erosion; use dechlorination blankets and/or dechlorination diffusers after/prior to spraying, dispose of ashes and partially burnt debris in dumpsters.

Maintaining an Operations and Maintenance document, or SWPPP for each municipal site will ensure proper management, and behavior at those sites. This document should also include inspections for these sites as a method of checking up on the individual site programs. Inspections, cleaning, and routine maintenance of stormwater structures is necessary to ensure the structures are functioning properly and stormwater is managed properly.

Road salt and other deicers are a safety item for most residents of Missouri. However the chloride concentrations in streams is increasing which can potentially to harm aquatic life and may impair drinking water.

So while there is a need for road salt, there are changes that can be made to use less salt and still clear the roads for the safety of the public. This is seen in product management. Loading, unloading and cleanup practices in the loading and parking areas can greatly reduce the amount of salt loss to precipitation and subsequent stormwater. A winter maintenance program which tracks the rock salt use and finds ways to manage the product to reduce loss on the municipal yard is the goal of any BMPs designed and implemented for rock salt. In addition, educating private entities to reduce their usage of salt by incorporating salt reduction practices into their procedures is vital.

In contrast with road salt, brine spreads more evenly, stays where it falls, and begins working immediately. This is because the salt is already in solution. As a result, spraying liquid brine is more effective while using less salt. Beet juice has been suggested as an alternative, however, in practice, the sugar in the runoff has been shown to cause nutrient loading of waterways to increase.

For training or additional resources including application rates please see;  
<https://www.wisaltwise.com/Tools/Application-Guidelines-Calculator>  
<https://www.iwla.org/conservation/water/winter-salt-watch/road-salt-best-practices>

Yard waste includes any organic debris such as grass clippings, leaves, and tree branches. Research by the U.S. Geological Survey show municipal leaf collection programs have the ability to reduce loads of total and dissolved phosphorus in a given drainage area by 84 and 83%, respectively, and total and dissolved nitrogen by 74 and 71%. This research indicates that nearly 60% of the annual phosphorus yield in urban and suburban environments comes from leaf litter in the fall, making it a huge contributor of nutrients to urban receiving waters.

Removing leaf litter from roads and drain systems means; cleaner streets, safety, and a reduced likelihood of clogged storm drain inlets. Educating residents to not put leaves in, or on storm inlets and/or providing alternate means of disposal can help reduce the amount of effort needed to clean storm drain inlets.

For more information please see;  
<https://www.sciencedirect.com/science/article/pii/S0048969716314462>  
<https://slco.org/watershed/stream-friendly-practices/dont-dump-debris/>

There is also free training on overall stormwater management for MS4 Operators;  
<https://www.torranceca.gov/home/showdocument?id=18591>  
<https://njmel.org/mel-safety-institute/webinars/>  
[https://www.youtube.com/watch?v=Z09Yz\\_qS1f4](https://www.youtube.com/watch?v=Z09Yz_qS1f4)  
<https://www.youtube.com/watch?v=ACP7DOdOEDE>

## **Part V – Rationale for General Terms and Conditions:**

### **Clean Water Act section 402(l)**

On December 7, 2012, the U.S. EPA promulgated a rule (77FR 72970) clarifying that discharges of stormwater from silviculture activities do not require a NPDES permit. On March 20, 2013, the U.S. Supreme Court ruled that discharges of stormwater that run off from logging roads into ditches, culverts, and channels did not require a NPDES permit as stormwater from industrial activity.

In January 2014, Congress amended Clean Water Act 402(l) to prohibit the requirements of NPDES permits for the discharge of runoff “resulting from the conduct of the following silviculture activities conducted in accordance with standard industry practice: nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage or road construction and maintenance.” In 2016, the U.S. EPA published its decision to not regulate forest road discharges under Phase II stormwater non-permitting programs.

### **Additional Federal Acts**

In accordance with 40 CFR 122.49(b) and (c) the operating permit cites the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA) and places the permittee on notice that the operating permit does not affect, remove or replace the requirements or compliance determination for NPDES operating permits. It is the responsibility of the permittee to determine if activities conducted within their MS4 or stormwater discharging from their MS4 are in compliance with the ESA and NHPA.

Assistance in determining applicability to ESA conditions and requirements can be found on the U.S. Fish and Wildlife Service (FWS) Endangered Species webpage, which is located at: <http://www.fws.gov/endangered/>. Additionally, the FWS Information for Planning and Conservation (IPaC) web-based project planning tool that streamlines the environmental review process is highly recommended and is located at: <http://ecos.fws.gov/ipac/>.

Assistance in determining applicability to NHPA conditions and requirements can be found on the Department’s State Historic Preservation Office Section 106 Review, which is located at: <https://mostateparks.com/page/84371/state-historic-preservation-office>. Additionally, the Advisory Council on Historic Preservation Citizen Guide to Section 106 Review, which explains the process, is located at: <http://www.achp.gov/citizensguide.html>.

In addition to the ESA and NHPA, this operating permit does not affect, replace or remove the requirements and compliance determinations with respect to substances not otherwise covered under a NPDES permit and regulated by federal law under the Resource Conservation and Recovery Act or the Comprehensive Environmental Response, Compensation, and Liability Act.

### **Anti-Backsliding**

Anti-backsliding is a provision in federal regulations CWA §303(d)(4); CWA §402(o); 40 CFR 122.44(l) that requires a reissued permit to be as stringent as the previous permit with some exceptions. The permit complies with Anti-backsliding regulations.



### **Anti-Degradation**

Antidegradation policies ensure protection of water quality for a particular water body on a pollutant by pollutant basis to ensure Water Quality Standards are maintained to support beneficial uses such as fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as an Outstanding National Resource Water or Outstanding State Resource Water [10 CSR 20-7.031(3)(C)]. Antidegradation policies are adopted to minimize adverse effects on water.

The Department has determined that the best avenue forward for implementing the Anti-degradation requirements into the MS4 general permit is by requiring the appropriate development and maintenance of a Stormwater Management Program.

### **Application requirements**

Small MS4s (as defined under 10 CSR 20-6.200) are to apply and obtain a small MS4 General Permit or site-specific permit in accordance with 40 CFR 122.33 and 10 CSR 20-6.200(5).

### **Compliance and Enforcement**

Enforcement is the action taken by the Water Protection Program (WPP) to bring an entity into compliance with the Missouri CWL, its implementing regulations, and/or any terms and conditions of an operating permit. The primary purpose of the enforcement activity in the WPP is to resolve violations and return the entity to compliance.

Dischargers of stormwater from regulated MS4s, as defined in the Missouri Stormwater Regulations 10 CSR 20-6.200 who do not obtain coverage under this or other Missouri general permits, or under a site-specific NPDES permit, will be in violation of the Missouri CWL and its implementing regulations and subject to civil penalties of up to \$10,000 per violation, per day. For entities covered under a NPDES permit, failure to comply with any NPDES permit requirement also constitutes a violation of the Missouri CWL and its implementing regulations.

### **Oil/Water Separators:**

Oil water separator (OWS) tank systems are frequently found at industrial sites where process water and stormwater may contain oils and greases, oily wastewaters, or other immiscible liquids requiring separation. Food industry discharges typically require pretreatment prior to discharge to municipally owned treatment works. Per 10 CSR 26-2.010(2)(B), all oil water separator tanks must be operated according to manufacturer's specifications and authorized in NPDES permits per 10 CSR 26-2.010(2) or may be regulated as a petroleum tank.

This permit authorizes the operation of OWS for the treatment of stormwater without the requirement to obtain a separate permit. If the OWS treats water other than precipitation which has run across the property (for example: wash water, effluent from shop drains, drips, spills, etc.) the facility must obtain an MOG14 or site specific permit to cover the discharges.

### **Pesticide Rule**

The Department has developed a Pesticide General Permit #MOG-870000 for point source discharges resulting from the application of pesticides. This permit has been developed as a result of federal requirements under NPDES.

The general permit authorizes the discharge of pesticides that leave a residue in water when such applications are made into, over or near waters of the United States. The department has determined that entities most likely affected by this permit include public health entities, including mosquito or other vector control districts and commercial applicators that service this sector. Others potentially affected by this permit include resource and land management entities, such as public and private entities managing public land; park areas and university campuses; as utilities maintaining easements and right-of-ways; golf courses; and other large residential developments which maintain a large grounds area. In addition, permits may be required for applications involving pesticide use for agricultural related activities when pesticides are applied to crops grown in or near a water of the United States.

The Department is collaborating closely with the Missouri Department of Agriculture, which already administers the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) along with the Missouri Pesticide Use Act, to ensure proper oversight of pesticide applications.

MS4s under this permit are subject to the pesticide rule. To determine if a permit is required, please visit the Department's website. The thresholds listed in Table 1 of the pesticide general permit will assist in determining if a permit is required. If a permit is required, the permittee/facility shall apply for either the Pesticide General Permit or a site-specific pesticide permit from the Department.

### **Secondary Containment**

Prior to release of stormwater in secondary containments, the presence of petroleum sheen and odor must be observed. Steps must be taken if petroleum sheen or odor are observed to remove the petroleum from the stormwater prior to release. All secondary containment valves must remain closed when not actively draining stormwater. Release of stormwater from secondary containment must be controlled so as not to cause physical impacts such as forming rills, transporting solids, or scouring vegetation. If the stormwater is contaminated, the MS4 operator has the option of pumping out the secondary containment and taking it to an accepting wastewater treatment facility for treatment. Causing a sheen to be released to the environment is a violation of this permit and general water quality standards at 10 CSR 20-7.031(4)(B).

**Standard Conditions:**

The standard conditions Part I are incorporated into this permit, and incorporate all sections of 10 CSR 20-6.010(8) and 40 CFR 122.41(a) through (n) by reference as required by law. These conditions, in addition to the conditions enumerated within the standard conditions should be reviewed by the facility to ascertain compliance with this permit, state regulations, state statutes, federal regulations, and the Clean Water Act.

**Water Quality Standards**

As noted previously, the nature of the MS4 program is technology-based, which is in accordance with Section §402(p)(3)(B)(iii) of the CWA with the establishment of the technology-based standard MEP. Many in the MS4 community believe that MEP is the only standard applicable for compliance determination, which for the most part (specifically for the six (6) minimum control measures, is correct). Given the litigious nature surrounding the “agreeability” of MS4 compliance with WQS, MS4 permits have been the subject of court cases for several years.

40 CFR 122.34(a)(1) clearly requires that the MS4 permit will require the MS4 permittee to, “...develop, implement, and enforce a storm water management program designed to reduce the discharge of pollutants from your MS4 to the maximum extent practicable (MEP), to protect water quality, and satisfy the appropriate water quality requirements of the Clean Water Act.” While this regulation seems to be in contradiction to Section §402(p)(3)(B)(iii) of the CWA due to the fact that it appears to require the permittee to “...protect water quality” and “satisfy the appropriate water quality requirements...” it actually is not; however, has been mistakenly applied to require strict, immediate compliance with WQS even in previously issued Missouri MS4 Master General Permits.

As noted in 64 FR No. 235, “*The Court, did, however, disagree with the EPA’s interpretation of the relationship between CWA sections 301 and 402(p). The Court reasoned that MS4s are not compelled by section 301(b)(1)(C) to meet all State water quality standards, but rather the Administrator or the State may rely on section 402(p)(3)(B)(iii) to require such controls.*” The discussion continues with, “...the 1996 Policy describes how permits would implement an iterative process using BMPs, assessment, and refocused BMPs leading toward attainment of water quality standards. The ultimate goal of the iteration would be for water bodies to support their designated uses...” and “EPA also believes the iterative approach toward attainment of water quality standards represents a reasonable interpretation of CWA section 402(p)(3)(B)(iii).”

A break-down of 40 CFR 122.34(a) is given in 64 FR No. 235, as follows, “*The first component, reduction to the MEP, would be realized through implementation of the six minimum measures. The second component, to protect water quality, reflects the overall design objective for municipal programs based on CWA section 402(p)(6). The third component, to implement other applicable water quality requirements of the CWA, recognizes the Agency’s specific determination under the CWA section 402(p)(3)(B)(iii) of the need to achieve reasonable further progress toward the attainment of water quality standards according to the iterative BMP process, as well as the determination that State or EPA officials who establish TMDLs could allocate waste loads to MS4s, as they would other point sources.*”

**Part VI - 303(D) List, Total Maximum Daily Load (TMDL)**

Section 303(d) of the CWA requires that each state identify waters that are not meeting water quality standards. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) List helps state and federal agencies keep track of waters that are impaired but not addressed by typical water pollution control programs. Federal regulations require permitting authorities to develop TMDLs to address impaired waters listed per Section 303(d) of the CWA. A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is impaired. Please visit the Department’s website to determine if you are listed in an approved or established TMDL at: <https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/tmdls>.

Federal regulation 40 CFR 122.34(a) establishes the requirements applicable to all MS4s with, “*Your NPDES MS4 permit will require at a minimum that you develop, implement, and enforce a storm water management program designed to reduce the discharge of pollutants from your MS4 to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.*” EPA translated this regulation into three parts in 64 FR No. 235, as follows, “*The first component, reductions to the MEP, would be realized through implementation of the six minimum measures. The second component, to protect water quality, reflects the overall design objective for municipal programs based on CWA section 402(p)(6). The third component, to implement other applicable water quality requirements of the CWA, recognizes the Agency’s specific determination under CWA section 402(p)(3)(B)(iii) of the need to achieve reasonable further progress toward attainment of water quality standards according to the iterative BMP process, as well as the determination that State or EPA officials who establish TMDLs could allocate waste loads to MS4s, as they would to other point sources.*”

The above citation of 64 FR No. 235 clearly states that MEP is specific to the six (6) MCMs and clearly establishes that Wasteload Allocations (WLAs) are applicable to MS4s. However, unlike other traditional point sources that utilize treatment facilities, the EPA clearly indicated that attainment of the WLA is to be conducted via “*the iterative BMP process.*” Thus, requiring any condition for the attainment of water quality standards in addition to the MCMs is going beyond MEP but the process for attainment of the WLA is still

achieved with BMPs using the iterative process of establishing BMPs, evaluating the BMPs, and refocusing on BMPs.

However, just because a WLA for any given pollutant(s) of concern (POC) has been established in a TMDL for a MS4, additional BMPs or modifications to BMPs for the six MCMs should not be required as a trigger action. Rather, the MS4 permittee subject to an effective and approved TMDL should first make a determination if the implementation of their MCMs is adequately meeting the requirements and assumptions of the TMDL. As noted in 64 FR No. 235, *“At this time, EPA determines that water quality-based controls, implemented through the iterative process today are appropriate for the control of such pollutants and will result in reasonable further progress towards the attainment of water quality standards.”* While potentially rare this does indicate that no further action may be necessary to implement the requirements and assumptions of the TMDL as the MS4 community may, through successful implementation to the MEP for each of the MCMs, have already demonstrated *“reasonable further progress.”* This, rightfully so, places the burden of support on the MS4 community; however, in order for the MS4 community to continue operating only under the six MCMs, the determination of beneficial use re-attainment must be reviewed and timely approved by applicable program staff (i.e., the MS4 Team and Watershed Protection Section staff).

If the requirements and assumptions of the TMDL are not being met, then the MS4 will need to, at a minimum, develop BMPs that target the given POC with the goal or design for the reduction of the pollutant. Due to the nature of stormwater controls via the iterative process, subsequent determinations can and should be made by the MS4 community to determine if *“reasonable further progress”* has resulted in the attainment of the WLA.

In addition to the initial determination or additional BMPs as required in the MS4 general permit, integrated planning actions may be considered as actions taken to specifically restore a waterbody’s beneficial uses. Regardless, if the MS4 permittee uses integrated planning or BMPs design to reduce pollutants, other factors need to be considered in accordance with 64 FR No. 235, which states, *“If the permitting authority (rather than the regulated small MS4 operator) needs to impose additional or more specific measures to protect water quality, then that action will most likely be the result of an assessment based on a TMDL or equivalent analysis that determines sources and allocations of pollutant(s) of concern. EPA believes that the small MS4’s additional requirements, if any, should be guided by its equitable share based on a variety of considerations, such as cost effectiveness, proportionate contribution of pollutants, and ability to reasonably achieve Wasteload reductions. Narrative effluent limitations in the form of BMPs may still be the best means of achieving those reductions.”*

In addition to the above, the TMDL portion of the permit (Part 3) requires the development and implementation of a TMDL Assumption and Requirement Attainment Plan (ARAP). While the TMDL ARAP is not a Schedule of Compliance actions and schedules established in the TMDL ARAP will be subjected to the federal regulations on Schedules of Compliance [40 CFR 122.47]. Specifically if the development and implementation of the TMDL ARAP is to be conducted in a period of time extending one calendar year, then the permittee will be required to report annually for either the status of the development of the plan or for the implementation of the plan based on 40 CFR 122.47(a)(3)(ii).

Regarding the time period allowed for development of the TMDL ARAP (i.e., as soon as practicable not exceeding 30 months), the Department has determined the 30 month time period is appropriate as it allows the permittee the necessary time and flexibility that is needed to ultimately achieve attainment with the TMDLs assumptions and requirements. The Department has experience in the facilitation of an adaptive SWMP, along with EPA Region 7, with a MS4 community that addressed the assumption and requirements of an applicable TMDL. The time period to develop the adaptive SWMP took more than 30 months, but the assumptions and requirements of the TMDL were more complex than other straight forward TMDLs. Thus, the 30 month maximum time period allows the permittee to determine or develop appropriate BMPs, measurable goals, funding sources, local votes, strategic planning, opportunity to engage interested parties and stakeholders, etc... However, it would be naïve to believe that all regulated MS4s could develop a plan in 30 months, which is why the permit also indicates that the permittee can request an extension to the 30 months.

Permittees seeking approval of the extension will need to provide appropriate justification of why the extension is needed, a revised time schedule of compliance, and reason for failing to meet the 30 month maximum time; however, the allowance of extending the time period beyond 30 months is not guaranteed.

**Stakeholder Outreach**

In an effort to improve overall effectiveness of the MS4 MOR04 permit renewal process, introduction to the MOR04C permit, and to maximize stakeholder input, the Department published a preliminary draft of this MS4 NPDES permit and conducted extensive outreach for stakeholders in the preparation of the draft MS4 NPDES permits. A listing of stakeholder meetings is as follows:

Meeting Location	Meeting Date	Total attendees	Number of regulated MS4s represented
Jefferson City, MO	March 2, 2020	5	2
Macon, MO	March 3, 2020	7	5
Springfield, MO	March 5, 2020	17	11
Lee’s Summit, MO	March 9, 2020	28	18
Poplar Bluff, MO	March 13, 2020	12	8
Web	March 23, 2020	13	10

Additionally, the Department held virtual meetings with municipal permittees in an effort to explain and gather feedback about proposed permit conditions. These meetings were broken down by MCM. Notification of such workshops was provided via e-mail invitation to all provided MS4 contacts in Missouri’s permitted municipalities. A listing of each workshop follows:

Meeting topic	Meeting Date	Total attendees	Number of regulated MS4s represented
MCM 1	April 6, 2020	37	23
MCM 3	April 7, 2020	30	21
MCM 6	April 9, 2020	37	23
MCM 5	April 13, 2020	42	29
MCM 4	April 14, 2020	35	24
MCM 2	April 14, 2020	28	17
Other parts of the draft permits	April 20, 2020	40	27

**Part VII – Administrative Requirements**

On the basis of preliminary staff review and applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the permit. The proposed determinations are tentative pending public comment.

**Public Meeting:**

A public meeting for this permit was held on July 30, 2020.

**Public Notice:**

The Department shall give public notice when a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest or because of water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and facility must be notified of the denial in writing.

The Department must give public notice of a pending permit or of a new or reissued Missouri State Operating Permit. The public comment period is a length of time not less than thirty (30) days following the date of the public notice, during which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed permit, please refer to the Public Notice page located at the front of this draft permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this permit was from September 4, 2020 through October 5, 2020

**Date of Fact Sheet:** August 17, 2020

SARAH WRIGHT, ENVIRONMENTAL PROGRAM ANALYST  
MUNICIPAL SEPARATE STORMSEWER SYSTEM (MS4) PERMITTING COORDINATOR  
MISSOURI DEPARTMENT OF NATURAL RESOURCES  
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STANDARD CONDITIONS FOR NPDES PERMITS  
ISSUED BY  
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION  
REVISED  
AUGUST 1, 2014

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

## Part I – General Conditions

### Section A – Sampling, Monitoring, and Recording

1. **Sampling Requirements.**
  - a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
  - b. All samples shall be taken at the outfall(s) or Missouri Department of Natural Resources (Department) approved sampling location(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.
2. **Monitoring Requirements.**
  - a. Records of monitoring information shall include:
    - i. The date, exact place, and time of sampling or measurements;
    - ii. The individual(s) who performed the sampling or measurements;
    - iii. The date(s) analyses were performed;
    - iv. The individual(s) who performed the analyses;
    - v. The analytical techniques or methods used; and
    - vi. The results of such analyses.
  - b. If the permittee monitors any pollutant more frequently than required by the permit at the location specified in the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reported to the Department with the discharge monitoring report data (DMR) submitted to the Department pursuant to Section B, paragraph 7.
3. **Sample and Monitoring Calculations.** Calculations for all sample and monitoring results which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.
4. **Test Procedures.** The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure that the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is “sufficiently sensitive” when; 1) the method minimum level is at or below the level of the applicable water quality criterion for the pollutant or, 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility’s discharge is high enough that the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015. These methods are also required for parameters that are listed as monitoring only, as the data collected may be used to determine if limitations need to be established. A permittee is responsible for working with their contractors to ensure that the analysis performed is sufficiently sensitive.
5. **Record Retention.** Except for records of monitoring information required by the permit related to the permittee’s sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

6. **Illegal Activities.**
  - a. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four (4) years, or both.
  - b. The Missouri Clean Water Law provides that any person or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than six (6) months, or by both. Second and successive convictions for violation under this paragraph by any person shall be punished by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

### Section B – Reporting Requirements

1. **Planned Changes.**
  - a. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility when:
    - i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
    - ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42;
    - iii. The alteration or addition results in a significant change in the permittee’s sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
  - iv. Any facility expansions, production increases, or process modifications which will result in a new or substantially different discharge or sludge characteristics must be reported to the Department 60 days before the facility or process modification begins. Notification may be accomplished by application for a new permit. If the discharge does not violate effluent limitations specified in the permit, the facility is to submit a notice to the Department of the changed discharge at least 30 days before such changes. The Department may require a construction permit and/or permit modification as a result of the proposed changes at the facility.
2. **Non-compliance Reporting.**
  - a. The permittee shall report any noncompliance which may endanger health or the environment. Relevant information shall be provided orally or via the current electronic method approved by the Department, within 24 hours from the time the permittee becomes aware of the circumstances, and shall be reported to the appropriate Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. A written submission shall also be provided within five (5) business days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.





STANDARD CONDITIONS FOR NPDES PERMITS  
ISSUED BY  
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION  
REVISED  
AUGUST 1, 2014

- b. The following shall be included as information which must be reported within 24 hours under this paragraph.
    - i. Any unanticipated bypass which exceeds any effluent limitation in the permit.
    - ii. Any upset which exceeds any effluent limitation in the permit.
    - iii. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit required to be reported within 24 hours.
  - c. The Department may waive the written report on a case-by-case basis for reports under paragraph 2. b. of this section if the oral report has been received within 24 hours.
3. **Anticipated Noncompliance.** The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The notice shall be submitted to the Department 60 days prior to such changes or activity.
  4. **Compliance Schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date. The report shall provide an explanation for the instance of noncompliance and a proposed schedule or anticipated date, for achieving compliance with the compliance schedule requirement.
  5. **Other Noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs 2, 3, and 6 of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 2. a. of this section.
  6. **Other Information.** Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.
  7. **Discharge Monitoring Reports.**
    - a. Monitoring results shall be reported at the intervals specified in the permit.
    - b. Monitoring results must be reported to the Department via the current method approved by the Department, unless the permittee has been granted a waiver from using the method. If the permittee has been granted a waiver, the permittee must use forms provided by the Department.
    - c. Monitoring results shall be reported to the Department no later than the 28<sup>th</sup> day of the month following the end of the reporting period.
- b. Notice.
    - i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
    - ii. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section B – Reporting Requirements, paragraph 5 (24-hour notice).
  - c. Prohibition of bypass.
    - i. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
      1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
      3. The permittee submitted notices as required under paragraph 2. b. of this section.
    - ii. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three (3) conditions listed above in paragraph 2. c. i. of this section.
3. **Upset Requirements.**
    - a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 3. b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
    - b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
      - i. An upset occurred and that the permittee can identify the cause(s) of the upset;
      - ii. The permitted facility was at the time being properly operated; and
      - iii. The permittee submitted notice of the upset as required in Section B – Reporting Requirements, paragraph 2. b. ii. (24-hour notice).
      - iv. The permittee complied with any remedial measures required under Section D – Administrative Requirements, paragraph 4.
    - c. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

## Section C – Bypass/Upset Requirements

1. **Definitions.**
  - a. *Bypass*: the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending.
  - b. *Severe Property Damage*: substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
  - c. *Upset*: an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
2. **Bypass Requirements.**
  - a. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. b. and 2. c. of this section.

## Section D – Administrative Requirements

1. **Duty to Comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
  - a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
  - b. The Federal Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed \$25,000 per day for each violation. The Federal Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement



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- imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than \$1,000,000 and can be fined up to \$2,000,000 for second or subsequent convictions.
- c. Any person may be assessed an administrative penalty by the EPA Director for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000. Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.
- d. It is unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law, or any standard, rule or regulation promulgated by the commission. In the event the commission or the director determines that any provision of sections 644.006 to 644.141 of the Missouri Clean Water Law or standard, rules, limitations or regulations promulgated pursuant thereto, or permits issued by, or any final abatement order, other order, or determination made by the commission or the director, or any filing requirement pursuant to sections 644.006 to 644.141 of the Missouri Clean Water Law or any other provision which this state is required to enforce pursuant to any federal water pollution control act, is being, was, or is in imminent danger of being violated, the commission or director may cause to have instituted a civil action in any court of competent jurisdiction for the injunctive relief to prevent any such violation or further violation or for the assessment of a penalty not to exceed \$10,000 per day for each day, or part thereof, the violation occurred and continues to occur, or both, as the court deems proper. Any person who willfully or negligently commits any violation in this paragraph shall, upon conviction, be punished by a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or both. Second and successive convictions for violation of the same provision of this paragraph by any person shall be punished by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.
2. **Duty to Reapply.**
- a. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.
- b. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
- c. A permittees with currently effective general permit shall submit an application for renewal at least 30 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
3. **Need to Halt or Reduce Activity Not a Defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
4. **Duty to Mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.
5. **Proper Operation and Maintenance.** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.
6. **Permit Actions.**
- a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
- i. Violations of any terms or conditions of this permit or the law;
- ii. Having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
- iii. A change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
- iv. Any reason set forth in the Law or Regulations.
- b. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.
7. **Permit Transfer.**
- a. Subject to 10 CSR 20-6.010, an operating permit may be transferred upon submission to the Department of an application to transfer signed by the existing owner and the new owner, unless prohibited by the terms of the permit. Until such time the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
- b. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Missouri Clean Water Law or the Federal Clean Water Act.
- c. The Department, within 30 days of receipt of the application, shall notify the new permittee of its intent to revoke or reissue or transfer the permit.
8. **Toxic Pollutants.** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Federal Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
9. **Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.



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10. **Duty to Provide Information.** The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.
11. **Inspection and Entry.** The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
  - a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
  - b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
  - c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
  - d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.
12. **Closure of Treatment Facilities.**
  - a. Persons who cease operation or plan to cease operation of waste, wastewater, and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the Department.
  - b. Operating Permits under 10 CSR 20-6.010 or under 10 CSR 20-6.015 are required until all waste, wastewater, and sludges have been disposed of in accordance with the closure plan approved by the Department and any disturbed areas have been properly stabilized. Disturbed areas will be considered stabilized when perennial vegetation, pavement, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover, if used, shall be at least 70% plant density over 100% of the disturbed area.
13. **Signatory Requirement.**
  - a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
  - b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
  - c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.
14. **Severability.** The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.



# Stormwater Management Plan

City of Carterville, Missouri

Permitting Period: Oct. 2021-Sept. 2026

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MCM 5 Checklists & Supporting Documents

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# Part 1 - Facility Information

## 1.A. GENERAL INFORMATION:

**NPDES #:** MOR04C002  
**Facility Name:** Carterville Phase II MS4  
**Facility Mailing Address:** 1200 East First Street, Carterville, MO 64835

**Owner's Name:** City of Carterville, Missouri  
**Owner's Physical Address:** 1200 East First Street, Carterville, MO 64835  
**Owner's Mailing Address:** 1200 East First Street, Carterville, MO 64835

**Primary Contact:** William Cline, City Administrator \*  
**Phone Number:** (417) 673-1341  
**Email:** admin@cartervillemo.com

**Facility Region:** Southwest Region  
(Main Office in Springfield, Satellite Office in Neosho)  
**Facility County:** Jasper County, MO

**Facility Type:** Small MS4  
**Facility SIC Code:** 9511  
**Facility NAICS Code:** 924110  
**Facility Description:** Discharges from Regulated Small MS4  
**Total MS4 Area (acres):** 2.06 sq. miles

\* If name of Primary Contact changes, that may be updated on the next Stormwater Management Program Report and/or via email to the Department at MS4@dnr.mo.gov.

## 1.B. ADJACENT WATERWAYS:

The permittee discharges to one permanently flowing stream (Class P), Center Creek, but not within the City limits.

The permittee is not within 100 feet of waters classified as public drinking water supply lakes (L1) or major reservoirs (L2).

The permittee does not discharge to any Wild and Scenic Riverways, Outstanding State Resource Waters, or streams designated for cold-water habitat. Therefore, the permittee is implementing no additional specific provisions for their continued integrity

The permittee does not discharge within two stream miles upstream of any biocriteria reference locations as defined in 10 CSR 20-7.031.

The permittee is not within 100 feet of any stream listed as Impaired on the 303(d) List  
Some of the Permittee's areas are defined as wetlands in the National Wetlands Inventory.

## 1.C. CRITICAL AREAS:

There are threatened or endangered species in the area. (See table below.) The Permittee has met eligibility criteria for protection of threatened or endangered species.

There are critical habitats in the area. (See table below.) The Permittee has met eligibility criteria for protection of critical habitats.  
 There are no historic properties in the area.

Table 1. Endangered Species/Critical Habitats

County	Species	Status	Habitat
Jasper	Gray Bat ( <i>Myotis grisescens</i> )	Endangered	Caves
Jasper	Arkansas Darter ( <i>Eteostoma cragini</i> )	Candidate	Rivers
Jasper	Neosho Madtom ( <i>Noturus placidus</i> )	Threatened	Rivers
Jasper	Ozark Cavefish	Threatened	Caves in the Boone & Burlington limestone formations of the Ozark Mountains

# Stormwater Outfalls and Receiving Waters City of Carterville, MO (Revised 01/23)

## **OUTFALL #1**

Legal Description	Sec 16, T28N, R32W, Jasper County
Longitude: -94.421624	Latitude 37.141111
Receiving Water	Unnamed Tributary to Center Creek (U)
1st Classified	Center Creek (P) – 3203 303(d) listed
USGS/ SUB WATERSHED	11070207-160010

Description: Roadside ditches entering unnamed tributary from East and West on both sides of HH Highway, approximately 400' West of AA Highway.

## **OUTFALL #2**

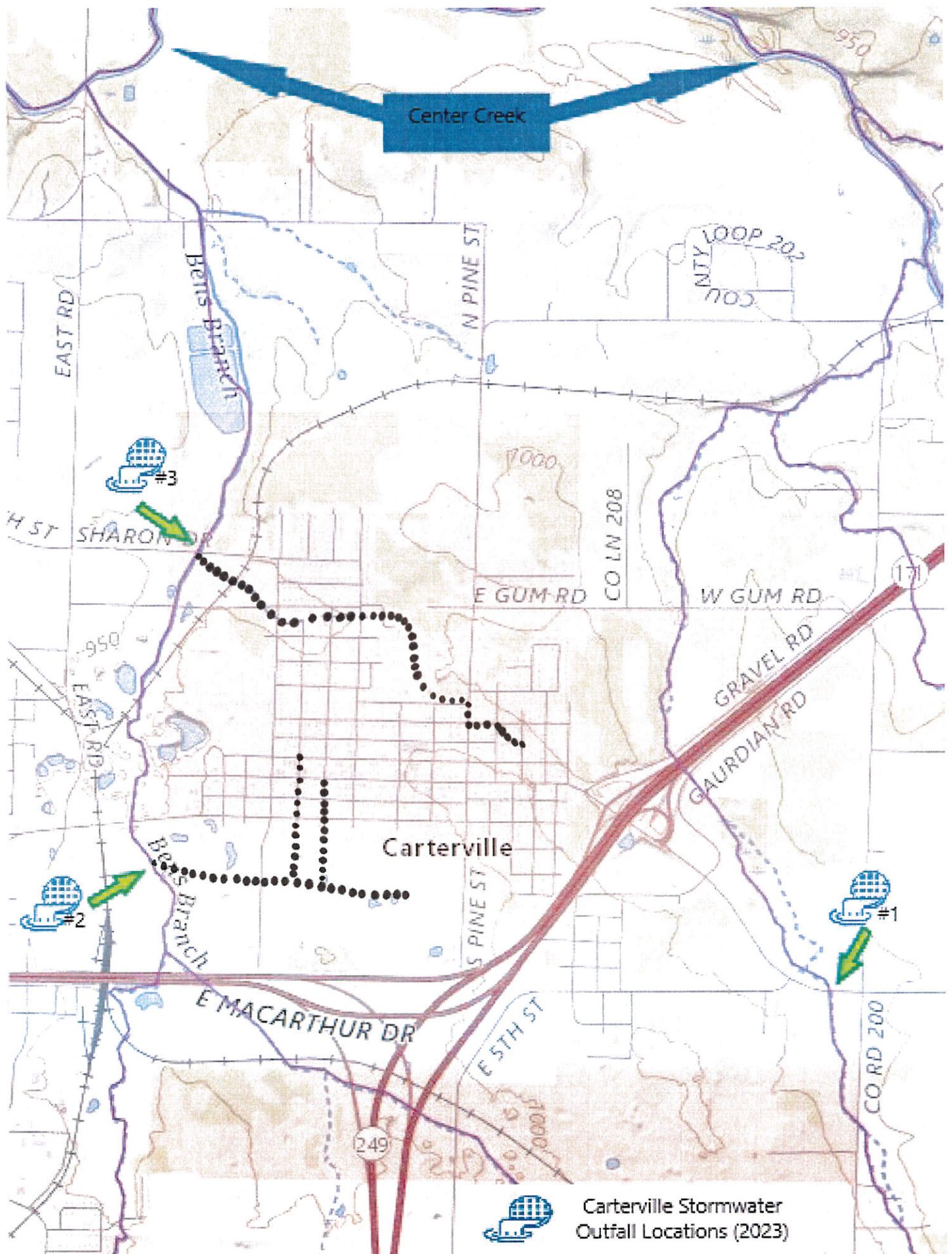
Legal Description	Sec 17, T28N, R32W, Jasper County
Longitude: – 94.452120	Latitude: 37.146654
Receiving Water	Ben's Branch (U)
1st Classified	Center Creek (P) – 3203 303(d) listed
USGS/ SUB WATERSHED	11070207-160010

Description: Open natural conveyance entering Ben's Branch from the East, approx. 350' upstream from Daugherty Steet and Ben's Branch intersection.

## **OUTFALL #3**

Legal Description	Sec 08, T28N, R32W, Jasper County
Longitude: – 94.449658	Latitude: 37.157687
Receiving Water	Ben's Branch (U)
1st Classified	Center Creek (P) – 3203 303(d) listed
USGS/ SUB WATERSHED	11070207-160010

Description: Open natural conveyance entering Ben's Branch from the East, approx. 95' upstream from Sharron Drive and Ben's Branch intersection.



..... Existing Storm Drains (Mapping Available at City Hall)

# Part 3 – Stormwater Management Program and Plan

## Background

The Municipal Separate Storm Sewer System (MS4) Permit requires each permittee to develop and implement a Stormwater Management Program. Each permittee creates and maintains a written Stormwater Management Plan (SWMP) for the permit cycle. The SWMP is a document describing the Program and is created to ensure consistency and continuity in the implementation of the Program.

The City of Carterville has chosen to participate in the “Comprehensive” version of the MS4 permit (MO-RO4C000) for the October 2021-September 2026 permit cycle. Carterville is a traditional MS4 with a population of less than 10,000. According to the table below, Carterville fits Group A. All BMPs in this SWMP have been chosen to correspond with the requirements for Group A.

NOTE: Throughout this SWMP document, permit language is denoted in *italics*.

### *Categories of Regulated Small MS4s under this comprehensive permit.*

*This comprehensive permit categorizes MS4s by the following categories, or Groups, based on the population served as determined by the most recent Decennial Census at the time of permit issuance, the type of Regulated MS4, and the co-permittee situation.*

<b>Group A</b>	<b>Group B</b>	<b>Group C</b>
<i>Traditional Small MS4s (cities) that serve a population of less than 10,000 within a UA;</i>  <b>Carterville fits this category.</b>	<i>Traditional Small MS4s that serve a population of at least 10,000 but less than 40,000; OR</i>	<i>Traditional Small MS4s that serve a population of 40,001 or more; OR</i>
<i>Class 2 counties; Non-traditional such as Universities, Federal facilities.</i>	<i>Class 1 counties</i>	<i>Co-permit Small MS4s</i>

*The MS4 Operator may add supplemental items to the SWMP. These items include but are not limited to:*

- *Maps;*
- *Standard operating procedures (SOPs);*
- *Inspection forms;*
- *Sample data;*
- *Operations and Maintenance Manual;*
- *Website or social media account tracking;*
- *Stream Team Activity Reports;*
- *Tracking and evaluation documents; and*
- *Documentation of agreements for co-permittees and/or cooperative agreements.*

*The MS4 Operator may replace or modify ineffective BMPs with effective BMPs*

## **Part 4 – Minimum Control Measures**

**4.0** Entities under coverage of the MOR04C general permit shall develop and implement a Stormwater Program that includes the following six (6) Minimum Control Measures (MCMs).

4.1 MCM#1: Public Education and Outreach on Stormwater Impacts

4.2 MCM#2: Public Participation

4.3 MCM#3: Illicit Discharge Detection and Elimination

4.4 MCM#4: Construction Site Stormwater Runoff Control

4.5 MCM#5: Post-Construction Stormwater Management in New Development & Redevelopment

4.6 MCM#6: Pollution Prevention/Good Housekeeping for Municipal Operations

NOTE: BMP = Best Management Practice



## **4.1 MCM 1. Public Education and Outreach (PEO) on Stormwater Impacts**

Carterville has implemented a public education and outreach program to distribute educational materials to the community and conduct outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff.

*The public education and outreach program shall, at a minimum include the following:*

### **4.1.A Target Audience**

*The MS4 Operator shall target specific audiences who are likely to have significant stormwater impacts.*

The City of Carterville is considered a traditional MS4 and is primarily a residential community. The primary audience for the City's Public Education program will be residents. With a population under 10,000, Carterville is in Group A, so no additional target audiences are required.

### **4.1.B Target Pollutants**

*The MS4 Operator shall target specific pollutant(s) in the permittee's education program. Each MS4 shall have a minimum of one target pollutant for each target audience from Section 4.1.A of this permit.*

Carterville has chosen target pollutants for the residential audience that will vary seasonally to coincide with the yard waste collection program. These target pollutants will include, but are not limited to, grass clippings & leaf litter.

### **4.1.C Best Management Practices (BMPs) for Outreach and Education**

*The MS4 Operator must utilize appropriate educational resources to be used as BMPs (materials, events, activities, etc.) in conjunction with the selected pollutants for the selected target audiences.*

*The MS4 Operator may change BMPs during the permit cycle if determined appropriate through tracking and adaptive management reviews show a different BMP may be more effective for the MS4. Any changes shall be reflected in the SWMP and explained in the MS4 Stormwater Management Program Report.*

The City of Carterville, as part of Group A, must choose a minimum of two Outreach and Education BMPs from Table III of the MS4 General.

Carterville has chosen the following Outreach and Education BMPs:



❖ **Stormwater Information on the City Website**

- Maintain a Stormwater Information page on the City website to provide educational material and links to further stormwater information.
- Measurable Goals: Maintain the webpage with up-to-date information and working links. All links will be checked, and the page will be updated as necessary, at minimum annually. Website will be maintained for the entire permit cycle.
- Tracking and Adaptive Management: The number of hits will be tracked. The City will use this to see which messages get reactions, and if certain messages may need more education.
- Target Audience: Residents
- Target Pollutants: Include, but are not limited to, grass clippings & leaf litter.
- Website Address: <https://cartervillemo.com/storm-water> .

❖ **Targeted education campaign (email)**

- Send Stormwater Information to resident subscribers' email.
- Measurable Goals: Send a minimum of one (1) times a year. The messages will address ways attendees can minimize or avoid adverse stormwater impacts or practices to improve the quality of stormwater runoff. Messages will be seasonally appropriate. Posting will be continued for at least one full year.
- Tracking and Adaptive Management: The number of emails will be tracked. The City will use current subscriber counts to send mass emails to residents. Quantity will increase as new subscribers are added.
- Target Audience: Residents
- Target Pollutants: Include, but are not limited to, grass clippings & leaf litter.
- Website Address: <https://cartervillemo.com/> , under “What’s Happening” heading.

**4.1.D Best Management Practices (BMPs) for Involvement**

*The MS4 Operator must create opportunities, or support activities that are coordinated by citizen groups, for residents and others to become involved with the Stormwater Management Program. The activities, (BMPs) must have an effort to impact stormwater runoff by improving water quality.*

The City of Carterville, as part of Group A, must choose a minimum of one Involvement BMP from Table IV of the MS4 General Permit.

Carterville has chosen the following Involvement BMP:

❖ **Street Sweeping Program**

- The City will provide a street sweeping program. Sweeping will be performed year-round and on an as needed basis.
- Measurable Goals: All streets within the city will be swept clear of all debris at least two (2) times per year.
- Tracking and Adaptive Management: Track the amount collected.
- Target Audience: Residents
- Target Pollutants: Grass clippings, leaf and trash litter.
- Permit Years: 2021-2026

**4.1.E** *The MS4 Operator shall create or support the involvement BMP(s) in Section 4.1.D.*

The City of Carterville provides the street sweeping program BMPs in Section 4.1.D.

**4.1.F Adaptive Management**

*Using adaptive management as required in parts 4.1.A.3.d and 4.1.B.1.c, all MS4 Operators shall review their Public Education and Outreach on Stormwater Impacts Program, at minimum, annually and update implementation procedures and/or BMPs as necessary within the requirements of this permit.*

*This may be conducted when preparing the annual MS4 Stormwater Management Program Report for submittal to the Department.*

Annual Review of MCM 1			
Year reviewed	Date of review	Reviewer(s)	Were changes made and noted?
2021	1-31-2022	William Cline	No changes were made at this time.
2022	1-5-2023	William Cline	Ability to quantify collection is limited. City will continue tracking portion collected at our facility only. Social media postings will be on city park page and through blog and email.
2023	1-7-2024	William Cline	Due to the loss of the city's social media presence, we will replace this BMP with a targeted educational email campaign. In addition the city will replace the year-round "yard waste collection" with a street sweeping program. This change is due to the fact that we can not quantify drop-off waste at 201 facility.
2024			
2025			

Table MCM1. Public Education and Outreach Program BMPs

Stormwater BMP	Target* Audience	Target Pollutant	Implementation Date	Update Frequency	Responsible Party	Measurable Goal	Tracking
Outreach and Education BMPs (min. 2)							
Create & Maintain Stormwater Information page on City website, see above for details (must have hit counter)	R	Include, but not limited to, grass clippings & leaf litter.	Sept. 2022	Annual. Check links. Update info.	City Administrator	maintain the webpage with up-to-date information and working links. All links will be checked. website will be maintained for the rest of the permit cycle.	Number of hits will be tracked.
Targeted educational campaign by email subscribers.	R	Include, but not limited to, grass clippings & leaf litter.	Throughout 2024	Annually (by season) during 2024	City Administrator	Email a minimum of one (1) time a year. The messages will address ways attendees can minimize or avoid adverse stormwater impacts or practices to improve the quality of stormwater runoff. Messages will be seasonally appropriate. Posting will be continued for at least one full year.	The number of sent emails, will be tracked.
Involvement BMPs (min. 1)							
Street sweeper program	R	Grass Clippings & Leaf Litter	Ongoing	As needed	City Administrator	All streets within city will be swept as needed but no less than two (2) times per year.	Track amount Collected
Other Items of Note							
Post link to 2021-2016 SWMP document on Stormwater page of City website	R	All pollutants addressed by SWMP	Sept. 2022	As needed	City Administrator	Post one link to SWMP	1 link posted
Annual Review of MCM 1	n/a	n/a	Each January	Each January	City Administrator	Perform annual review of MCM 1 BMPs.	Note review date and any changes in section 4.1.F of SWMP document.

R = Residents

## **4.2 MCM 2. Public Participation**

Cartersville has implemented a comprehensive public participation program that provides opportunities for public participation in the development and oversight of the City's Stormwater Program. This program provides opportunities for public participation in the permittee renewal process and complies with state and local public notice requirements. Additionally, the program provides opportunities for public participation in activities related to developing and implementing the Stormwater Management Program.

*The public participation program shall, at a minimum include the following:*

### **4.2.A Public Notice Period**

*The MS4 Operator shall hold a public notice period for a minimum of thirty (30) days to allow the public to review the draft permit, and description of the MS4s Stormwater Management Program (this may be the SWMP) prior to the submission of the renewal application to the Department.*

### **4.2.B Items to be Posted on Website**

*As part of the public notice, the required items shall be posted on the MS4 Operators' website with a way to submit comments, along with the standard public notice methods for the MS4.*

- 1. The permittee shall respond to comments received during the comment period.*
- 2. The MS4 Operator shall retain copies of any public comments and records of information submitted by the public received as part of the public notice process. These comments and responses shall be made available to the public or the Department upon request.*

The permit renewal application, public notice, and related information were posted on the City's website, <https://cartersvillemo.com/>.

### **4.2.C Public Meeting**

*The MS4 Operator shall hold a public information meeting to provide information on, or describe the contents of, the proposed Stormwater Management Program. This meeting shall be advertised at least thirty (30) days prior to the public meeting.*

- 1. As part of the notice of public meeting, the MS4 Operator will use a public website and shall post on that site, along with public notice at city offices, the notice of the public informational meeting, including the date, time and location. A screen capture will be retained by the operator showing notification was made.*
- 2. The meeting will be held within the service area of the MS4.*
- 3. Dates for the previous public hearings as well as future meetings are as follows:*

Dates of public notice: Mar 8, 2021 – Apr 13, 2021  
Dates of notice of meeting: Mar 8, 2021 – Apr 13, 2021  
Date of meeting: Apr 13, 2021  
Location (or virtual): City Hall  
Public Meeting Attendance: 15 people

Preparation of permit renewal application and supportig documentation: Oct-Dec 2025  
Dates of next public notice: Jan-Feb 2026  
Dates of notice of meeting: Jan-Feb 2026  
Date of next meeting: March 2026  
Planned location (or virtual): City Hall  
Public Meeting Attendance: TBD

#### 4.2.D Public Comments

*The MS4 Operator shall have a publicly available method to accept public inquiries, or concerns, and to take information provided by the public about stormwater and stormwater related topics.*

Written comments can be submitted in person or by mail, or email to William Cline, City Administrator, at City Hall ([admin@cartervillemo.com](mailto:admin@cartervillemo.com)). Comments are to be tracked electronically or on paper by Mr. Cline.

#### 4.2.E Stormwater Management Panel or Committee

*If the MS4 Operator utilizes a stormwater management panel or committee, the MS4 Operator shall provide opportunities for citizen representatives on the panel or committee. The attendance of the meeting shall be recorded.*

The City of Carterville does not utilize a stormwater management panel or committee.

#### 4.2.F Annual Updates to Governing Board

*If the permittee has a governing board such as; County Council, City Council, or Board of Curators, a representative of the MS4 Operator, who is familiar with the MS4 Stormwater Program, shall provide an update to the governing board. This shall be conducted at minimum, annually with the status of, or updates on, the Stormwater Management Program, and compliance with the Stormwater Management Program.*

An update will be given annually to the City Council, prior to submission of the annual Stormwater Report.

Annual Updates to City Council			
Year to be Reported Upon	Date of update	Method used to update the Board of Aldermen	Name of MS4 representative(s)
2021:	2-8-2022	Council meeting (monthly)	William Cline
2022:	1-10-2023	Council meeting (monthly)	William Cline
2023:	1-9-2024	Council meeting (monthly)	William Cline
2024:			
2025:			

**4.2.I Adaptive Management**

*Using adaptive management, all MS4 Operators shall review their Public Participation Program, at minimum, annually and update implementation procedures as necessary within the requirements of this permit. This shall be used to review how to best reach the public, the effectiveness of the mechanisms, the effectiveness of reaching the public and the MS4 Governing board and if the community and MS4 government are working together for water quality.*

*Any additional events and/or BMPs shall be acknowledged in the Stormwater Management Program.*

Annual Review of MCM 2			
Year reviewed	Date of review	Reviewer(s)	Were changes made and noted?
2021	1-31-2022	William Cline	No changes were made at this time.
2022	1-5-2023	William Cline	Annual council updates will be given prior to annual report submission to allow for input. SWMP updated
2023	1-7-2024	William Cline	No changes were made to MCM 2
2024			
2025			

Table MCM2. Public Involvement and Participation Program BMPs

Stormwater BMP	Target* Audience	Implementation Date	Responsible Party	Measurable Goal	Tracking
<b>Permit Renewal Process</b>					
Provide Public Notice for Draft Permit Renewal Application and Associated Mapping	R	Mar-8-2021 to Apr-13-2021	City Administrator	30 days minimum Public Notice provided so public could view and comment on the draft Permit Renewal Application	Complete
Above noted items posted on City Website	R	Mar-8-2021	City Administrator	Items Posted for public viewing and comment	Complete
Provide Public Notice for Public Meeting about Stormwater Management Program	R	Mar-8-2021 to Apr-13-2021	City Administrator	30 days minimum Public Notice provided	Complete
Host Public Meeting about the Stormwater Management Program	R	Apr-13-2021	City Administrator	Host minimum of one public meeting to inform the public about the Stormwater Management Program and provide opportunities for community input.	Finished. One meeting hosted at City Hall.
Provide Method for Public Comment. Record and address comments.	R	Mar-8-2021 to Apr-13-2021	City Administrator	Provide Method for Public Comment. Record and address comments.	Complete for the Permit Renewal If other comments come in about the Stormwater Program, address them when received.
<b>Ongoing BMPs</b>					
Annual MS4 Program Update to City Council	City Council	Each January	City Administrator	Annual update to City Council. Include status and progress of MS4 Stormwater Management Program.	One update per year. Record when update was given each year in section 4.2.F of SWMP
Annual Review of MCM 2	n/a	Each January	City Administrator	Perform annual review of MCM 2 BMPs.	Note review date and any changes in section 4.2.I of SWMP document.

R = Residents

### **4.3 MCM 3. Illicit Discharge Detection and Elimination (IDDE)**

The City of Carterville has implemented, and enforces, a program to detect and eliminate illicit discharges (as defined in 10 CSR 20-6.200 at 40 CFR 122.26(b)(2)) into the regulated MS4.

*The illicit discharge detection and elimination program shall at minimum, include the following:*

#### **4.3.A Stormwater & Outfall Mapping**

*IDDE program will include a current storm sewer system map that shall be updated as needed to include features which are added, removed, or changed. This map may be paper or electronic.*

Carterville has a map that contains the location of MS4 outfalls and boundary of the regulated MS4 area (City Limits). This map was updated in January 2023 to also contain:

- Existing storm drain system and the names and locations of all Waters of the State receiving discharges from the City's MS4 Outfalls.
- Updated outfall locations

A copy of the existing map is included in section 2.0 of this SWMP.

#### **4.3.B Outfall Information Tracking**

*The MS4 Operator must record the sources of information used for the map and track, at minimum:*

- *A numbering or naming system of all outfalls;*
- *Dates that the outfall locations were verified/ or last field survey;*
- *For newly added outfalls, the date that it was added to the storm sewer system.*

The City's Outfall Mapping utilizes a numbering system for all Outfalls. If additional Outfalls are added during this permit period, the dates will be noted on the mapping. Outfall locations will be verified during IDDE inspections and the dates will be recorded on the inspection forms.

#### **4.3.C Regulatory Mechanism for Illicit Discharge Prevention**

*The MS4 shall effectively prohibit non-stormwater discharges into the permittee's storm sewer system and implement appropriate enforcement procedures and actions.*

The City of Carterville uses Chapter 250 of City Code to effectively prohibit illicit discharges to the MS4. This "Illicit Discharge Ordinance" gives the City authority to inspect for illicit discharges and includes enforcement measures. This City Code can be found online at: <https://cartervillemo.com/file-downloads>, under the "City Code Book" link.

#### **4.3.D Dry Weather Field Screening**

*IDDE program will include a dry weather field screening strategy.*

1. *The MS4 Operator shall conduct (or have conducted on their behalf) outfall field assessments. The screening shall be conducted during dry weather conditions (a*



- minimum of 72 hours after the last precipitation event) to check for the presence of a discharge.*
- a. A minimum of 60% of all outfalls shall be screened during the permit cycle.*
  - b. Priority areas, such as those listed in 4.3.H, shall be screened each year.*
2. *Dry weather screening shall include a checklist or other tracking device to; ensure a complete inspection of each outfall, enhance consistency, and to track the field screening. When discharge is present, the checklist or tracking device shall note the following general observations and physical characteristics at a minimum:*
- a. Date and time;*
  - b. Weather conditions and temperature (air & water);*
  - c. Color of discharge;*
  - d. Estimate of flow rate (this may be noted qualitatively);*
  - e. Odor;*
  - f. Surface scum, algal bloom, floatables or oil sheen present;*
  - g. Deposits or stains (note the color);*
  - h. Turbidity (may be noted qualitatively);*
  - i. Stream impact including vegetation, fish, wildlife;*
  - j. Length of impacted stream; and*
  - k. Notes of an obvious source of flow (such as lawn irrigation, etc.)*

Cartersville has implemented an IDDE Inspection program that utilizes dry-weather field screening to detect and address non-stormwater discharges, including discharges from illegal dumping and spills.

Procedures for inspection are contained within the City’s “Illicit Discharge Detection & Elimination Field Investigation Guide,” dated 2022. During field inspections, the City uses an inspection checklist, called the “Illicit Discharge Inspection Field Sheet,” that includes the above-listed minimum observations and physical characteristics.

A digital copy of the IDDE Field Guide is available on the City’s Stormwater website (<https://cartersvillemo.com/storm-water>). A copy of the Inspection Field Sheet is included under Appendix MCM3. Physical copies of the IDDE Field Guide and Inspection Field Sheet are used in the field by inspection staff.

Each outfall is inspected a minimum of once per permit cycle. Additional inspections may occur if there is a complaint or if a priority area is designated.

Number of IDDE inspections for each year are recorded in the table below.

IDDE Inspections for the Year		
	Amount (% or #) per year of permit cycle	Any specific priority areas included: (See also 4.3.H)
2021:	75%	South of Lewis (multiple septic systems) & Outfalls
2022:	100%	Same as previous but added HH & 5th area.
2023:	100%	Inspected revised outfalls (now 3 locations)
2024:		
2025:		

#### **4.3.E Diagnostic Monitoring Procedures**

*The MS4 Operator shall maintain diagnostic monitoring procedures to detect and investigate unknown non-stormwater flows as part of the dry weather screening program.*

Procedures for Illicit Discharge Inspection are contained within the City’s “Illicit Discharge Detection & Elimination Field Investigation Guide,” dated 2022. During field inspections, the City uses an inspection checklist, called the “Illicit Discharge Inspection Field Sheet.”

A digital copy of the IDDE Field Guide is available on the City’s Stormwater website (<https://cartervillemo.com/storm-water>). A copy of the Inspection Field Sheet is included under Appendix MCM3. Physical copies of the IDDE Field Guide and Inspection Field Sheet are used in the field by inspection staff.

#### **4.3.F Tracing the Source**

*The MS4 Operator shall maintain procedures for tracing the source of an illicit discharge. If initial screening indicates that a dry weather discharge contains pollutants, or if an illicit discharge is suspected from another reporting method, the source shall be traced.*

Procedures for tracing the source of an Illicit Discharge are contained within the City’s “Illicit Discharge Detection & Elimination Field Investigation Guide,” dated 2022. A digital copy of the IDDE Field Guide is available on the City’s Stormwater website (<https://cartervillemo.com/storm-water>). Physical copies of the IDDE Field Guide are used in the field by inspection staff.

#### **4.3.G Removing the Source**

*The MS4 Operator shall maintain procedures for removing the source of the discharge. After locating the source, the pollutant and source must be removed. The exact procedure will depend on the source and the circumstances.*

Procedures for removing the source may vary widely, depending on the source and circumstances. Removal procedures may be as simple as a friendly conversation with a property owner. Or a public education campaign may be indicated, if the source is determined to be more widespread. Chapter 250 of City Code authorizes additional, specific enforcement measures for illicit discharge issues. Enforcement procedures in the ordinance include: Notice of Violation, fines, abatement of the problem by the City (or its agent), cost of abatement to be paid by violator, and possible civil action and/or criminal charges, as the situation requires. Appeal procedures are also included in the ordinance. (This City Code can be found online at: <https://cartervillemo.com/file-downloads>, under the “City Code Book” link.)

#### **4.3.H Priority Areas**

*In order to prevent further illicit discharge, the MS4 Operator shall identify priority areas such as, but not limited to:*

- *Areas with evidence of ongoing illicit discharges;*
- *Areas with a past history of illicit discharges;*
- *Certain land use influencing stormsewer/ proximity of potential pollutant sources;*

- Areas of higher population density;
- Neighborhoods with onsite sewage systems;
- Areas with known litter or dumping issues;
- Areas with large or increased number of citizen complaints; and
- Industrial areas.

Annually, the MS4 Operators shall evaluate this priority area list and/or map and update as necessary to reflect changing priorities.

Record IDDE Inspection Priority Areas on the following table.

	IDDE Inspection Priority Area(s)
2021:	Areas targeted were existing outfalls as well as storm drainage ditches south of Lewis street due to numerous septic systems.
2022:	Same targets as 2021 but roadway ditches around 5th and HH were added due to unusual discoloration in roadway ditch. (was determined to be red algae by DNR)
2023:	Cartersville will continue with the existing priority areas minus the 5th and HH location which was resolved.
2024:	
2025:	

#### 4.3.I Written Procedures for IDDE Program Implementation

*The MS4 Operator shall maintain written procedures for implementing the IDDE Program, including those components described within this section, to ensure program continuity and consistency.*

Procedures for implementation of the IDDE Program are contained within the City’s “Illicit Discharge Detection & Elimination Field Investigation Guide,” dated 2022. A digital copy of the IDDE Field Guide is available on the City’s Stormwater website (<https://cartersvillemo.com/storm-water>).

#### 4.3.J Investigation Timeline

*The MS4 Operator must conduct investigations in response to field screening discoveries, spills, or in response to complaints from the public, municipal staff, or adjacent MS4s.*

- 1. Immediately respond to all illicit discharges, including spills, which are determined to constitute a threat to human health, welfare, or the environment.*
- 2. Investigate within five (5) business days, on average, any complaints, reports or monitoring information that indicates a potential illicit discharge which does not constitute a threat to human health, welfare or the environment.*

3. If illicit connections or illicit discharges are observed related to, discharging to, or discharging from, an adjacent MS4 Operator’s municipal storm sewer system, the MS4 Operator must notify the other MS4’s Operator within 24 hours of discovery or as soon as practicable.

The City of Carterville will:

1. Immediately respond to all illicit discharges, including spills, which are determined to constitute a threat to human health, welfare, or the environment.
2. Investigate within five (5) business days, on average, any complaints, reports or monitoring information that indicates a potential illicit discharge which does not constitute a threat to human health, welfare, or the environment.
3. Notify adjacent MS4 Operators if illicit connections or illicit discharges are observed related to, discharging to, or discharging from, that Operator’s municipal storm sewer system. Notification will take place within 24 hours of discovery or as soon as practicable.

Adjacent MS4	Contact person(s)	Phone number/ email
City of Webb City	Public Works	417.673.4651
Jasper County	Health Department	417.358.3111

**4.3.K Enforcement Procedures**

*The MS4 Operator shall have procedures for appropriate enforcement, this may include fines, the ability to collect cleanup and abatement costs, and actions to ensure that the permittee’s illicit discharge ordinance (or other regulatory mechanism) is being implemented.*

Enforcement procedures for illicit discharge issues are laid out in Chapter 250 Article III of City Code. Procedures in the ordinance include: Notice of Violation, fines, abatement of the problem by the City (or its agent), cost of abatement to be paid by violator, and possible civil action and/or criminal charges, as the situation requires. Appeal procedures are also included in the ordinance. (This City Code can be found online at: <https://cartervillemo.com/file-downloads>, under the “City Code Book” link.)

**4.3.L Database for Tracking IDDE Actions**

*The MS4 Operator shall maintain a database, or other centralized system, to track dry weather field screenings, spills, incidents, and investigations.*

The City of Carterville tracks all field screenings, spill, incidents, and investigations. Paper and digital copies of all tracking documents will be kept at the City Hall offices for the entire MS4 permit cycle. Records may be kept longer if deemed necessary.

**4.3.M IDDE Education**

*The MS4 Operator shall inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste, this may work with part 4.1 and part 4.6 of this permit (MCM #1 and MCM #6).*

Public education, for residents and businesses, is covered under part 4.1 of this SWMP. For education of City staff, see section 4.3.Q and 4.6 of this SWMP.

#### **4.3.N Review/Update of IDDE Program**

*All MS4 Operators shall review their IDDE Program, at minimum, annually and update implementation procedures as necessary.*

#### **4.3.O Review/Update of IDDE Program for Existing Permittees**

*Existing permittees shall evaluate their current program to ensure that it is in compliance with this permit.*

- 1. Any revisions to the ordinance or regulatory mechanism shall be complete in the first year of the permit cycle.*
- 2. Maintain an updated map with the items listed above. Items not included in the current map must be added within the first 2 years of the permit cycle.*

The mapping required in 4.3.A above has been updated.

**4.3.P** The City of Carterville is not a new permittee, so 4.3P is not applicable.

#### **4.3.Q IDDE Training Program for Field Staff**

*The MS4 Operator must develop and implement or maintain a training program for all municipal field staff, who, as part of their normal job responsibilities, may come into contact with or otherwise observe an illicit discharge or illicit connection to the storm sewer system.*

*Reviews of the training effectiveness shall be considered after municipal site inspections or after an illicit discharge incident occurs. If a certain department or facility did not perform the way they were trained, or if an issue arises that was not handled properly, the MS4 Operator should consider if the training is enough or is ineffective. The MS4 Operator shall consider ways to survey or test staff to see if the training is effective*

The City of Carterville will provide Illicit Discharge training to all inspection staff and staff who may handle materials which may become an illicit discharge. Training may be conducted in person or using online resources.

1. Each applicable staff member will be trained at minimum within one year of being hired.
2. Applicable staff include:
  - a. IDDE inspection staff;
  - b. Building inspection staff;
  - c. Fleet maintenance staff;
  - d. Staff at facilities with fuel, chemicals, washing of vehicles or equipment;
  - e. Road maintenance staff;
  - f. Road salt/de-icing staff; and
  - g. Parks, swimming pool, or golf course staff who encounter spills, equipment or vehicle washing, fueling, chemicals, etc.

Reviews of the training effectiveness will be considered after municipal site inspections or after an incident occurs. If a certain department or facility did not perform the way they were trained,

or if an issue arises that was not handled properly, the City will consider if the training is enough or is ineffective.

Records of IDDE Training will be kept with other staff training records under section 4.6 of this SWMP. Reviews of training effectiveness will also be kept under section 4.6.

**4.3.R Adaptive Management**

*Using adaptive management, the MS4 Operator shall review their IDDE Program, at minimum, annually and update implementation procedures as necessary. This data shall be used to continuously evaluate the effectiveness of each BMP and the implementation of each BMP. Any additional BMPs shall be acknowledged in the Stormwater Management Program report.*

*List any additional programmatic BMPs and when they were added to the Stormwater Management Program. (Examples of programmatic BMPs include: mapping of entire stormsewer system, adopting a standard operating procedure for dry weather screening, etc.)*

Annual Review of MCM 3			
Year reviewed	Date of review	Reviewer(s)	Were changes made and noted?
2021	1-31-2022	William Cline	No changes were made at this time.
2022	1-5-2023	William Cline	Outfalls were reduced to 3 within the city based on state & federal definition. Map was updated and SWMP revised to reflect new outfalls.
2023	1-7-2024	William Cline	No changes made other than to outfall locations/priority areas stated in table 4.3.H.
2024			
2025			

Table MCM3. Illicit Discharge Detection and Elimination Program BMPs

Stormwater Goal (BMP)	Permit Section	Implementation Date	Update Frequency	Responsible Party	Measurable Goal	Tracking
<b>Mapping</b>						
Stormwater System & Outfall Mapping	4.3.A	Completed	As needed	City Administrator	Update mapping to include storm drain system & receiving waters. Update as needed	Completed
Outfall Information Tracking	4.3.B	Completed, other than updates	As needed	City Administrator	Maintain outfall information (4.3.B) and update as needed, including dates when any outfall locations are surveyed.	Completed
<b>Regulatory Mechanism and Enforcement</b>						
Regulatory Mechanism - Illicit Discharge Ordinance	4.3.C 4.3.J 4.3.K	Completed	As needed	City Administrator	Maintain and Enforce Illicit Discharge Ordinance. Maintain enforcement procedures (included in ordinance).	Completed
<b>Inspection</b>						
Dry-weather Inspection of Each Outfall	4.3.D	Ongoing	As needed	Building Inspector	Inspect all Outfalls (and any new ones) once per permit cycle.	Inspections tracked by keeping Inspection Sheets on file.
Fill Out Inspection Field Sheet for Each Outfall Inspected	4.3.D	On day of inspection	As needed	Building Inspector	Use the Inspection Field Sheet as a checklist to ensure complete inspection of each outfall.	Use Inspection Field Sheet for each inspection. Keep on File.
Identify Priority Areas for Inspection	4.3.H	Annual	Annual	City Administrator	Identify priority areas for IDDE Inspection, according to Permit section 4.3.H.	Record any priority areas in section 4.3.H of the SWMP
Maintain Written Procedures for Inspection and Tracing the Source	4.3.D-4.3.F	Completed	As needed	City Administrator	Maintain the IDDE Field Guide, which contains the required written procedures for Permit sections 4.3.D-4.3.F	Completed
<b>Education/ Training/ Review</b>						
IDDE Information to Public	4.3.M	See MCM#1	See MCM#1	See MCM#1	See MCM#1	See MCM#1
IDDE Training for Field Staff	4.3.Q	2022	Annual	City Administrator	IDDE Training for Inspectors and all staff who handle materials that may become an illicit discharge. Initial training for all, then within 1 year of hire for new employees	Track names/number of employees/departments trained in section 4.6.A & 4.6.B of the SWMP
Annual Review of MCM 3	4.3.R	Each January	Each January	City Administrator	Perform annual review of MCM 3 BMPs.	Note review date and any changes in section 4.3.R of SWMP document.

## **4.4 MCM 4. Construction Site Stormwater Runoff Control**

Cartersville has implemented and will enforce a program to reduce pollutants in any stormwater runoff to the MS4 from construction activities that result in land disturbance of greater than or equal to one acre. Reduction of stormwater discharges from construction activity disturbing less than one acre are to be included in the program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more.

### **4.4.A Regulatory Mechanism**

*The MS4 Operator shall have a law, ordinance and/or other regulatory mechanism to require construction site runoff control BMPs at construction/land disturbance sites greater than or equal to one (1) acre or less than one acre if the construction activity is part of a larger common plan or development or sale that would disturb one acre or more. The mechanism shall include sanctions which are designed to ensure compliance, to the extent allowable under State, or local law.*

The City of Cartersville adopting (ord.#3014 (2024)) a regulatory mechanism to control construction site runoff. This regulatory mechanism combined ordinances and a Stormwater Management Criteria manual to:

- Regulate pollutants in stormwater runoff from construction activities;
- Lay out procedures for acquiring a Grading Permit;
- Establish legal authority for the City to inspect permitted construction sites;
- Establish legal authority for the City to enforce the regulations through denial of permit, stop-work orders, revocation of permit, and criminal charges, with associated fines and other penalties.

The City will regulate sites that disturb one or more acres of land, as well as those sites that disturb less than one acre if the disturbance is part of a larger common plan of development or sale that would disturb one acre or more.

### **4.4.B Pre-Construction Plan Review**

*The MS4 Operator shall review pre-construction plans.*

The City of Cartersville will perform pre-construction plan reviews. During review, the City, or its agent, will:

1. Evaluate threats to water quality, taking into account:
  - a. Soil erosion potential;
  - b. Site slope;
  - c. Project size and type;
  - d. Sensitivity of receiving waterbodies;
  - e. Discharge flow type (pipe or sheet flow);
  - f. Location of discharge point in relation to receiving water;
  - g. Proximity of the site to receiving waterbodies; and
  - h. Other factors relevant to the MS4 service area.
2. Utilize a checklist to ensure consistency and completeness. (A copy of this checklist will be included under Appendix MCM 4.)
3. Require construction site operators to select, install, implement, and maintain appropriate stormwater control measures. This includes temporary BMPs throughout the life of the land



disturbance, and permanent BMPs which remain on site as required by local codes and ordinances.

4. Consider ways to minimize disturbed areas through actions such as, phased construction requirements, temporary seeding or sodding, or erosion mats to exposed areas.
5. Require construction site operators to control construction-site waste that may cause adverse impacts to water quality. (Trash, concrete wash-out, etc.)

#### **4.4.C Authority to Inspect and Enforce**

*The MS4 Operator shall establish authority for site inspections and enforcement of control measures. To the extent allowable by state, federal, and local law, all MS4 Operators shall implement procedures for inspecting construction/land disturbance projects.*

The ordinance will establish authority for site inspection and enforcement of control measures. The City will implement procedures for inspecting construction/land disturbance projects.

The regulatory mechanism for the construction site runoff control program will include the following.

1. Identification of sites for inspection based on nature of the construction activity, topography, disturbed area, and the characteristics of soils and sensitivity of, or proximity to, receiving water.
2. Construction site inspections will include assessment of compliance with the City's Stormwater Regulations and other applicable ordinances.
3. The inspections will evaluate any structure that functions to prevent pollution of, or remove pollutants from, stormwater. Targeted pollutants will include construction wastes such as paints and solvents, equipment fluids, and construction debris/litter.
4. Final inspections (upon completion of the land disturbance and prior to final approval of construction project) will ensure all disturbed areas have been stabilized and all temporary erosion and sediment control measures are removed.
5. The inspections conducted by the City's inspector are to be documented with a checklist. The checklist will include structural BMPs. Inspectors will check on the self-inspections which are to be conducted by the construction site operator. (A copy of the inspection checklist will be included under Appendix MCM 4.)

#### **4.4.D Enforcement Procedures**

*The construction site runoff control program shall include an established, escalating enforcement policy that clearly describes the action to be taken for violations. The program shall have written procedures to ensure compliance with the MS4 Operator's construction site runoff control regulatory mechanism. The MS4 Operator must have a minimum of two (2) enforcement actions.*

Enforcement procedures for construction site runoff problems will be laid out in the regulatory mechanism.

#### **4.4.E Construction Site Self-Inspection Procedures**

*The MS4 Operator shall require the construction site operator to conduct inspections at minimum:*

1. Every fourteen (14) days, when construction is active.
2. Within 72 hours of any storm event, and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased.

*Checklists used for these inspections conducted by construction site operators shall either be submitted to the MS4 Operator, or the MS4 Operator shall verify that these inspections are being conducted by the construction site operator checklists during MS4 Operator inspections.*

Each construction site covered under the regulatory mechanism is also covered under the Missouri Land Disturbance Permit MO-RA00000. The state permit requires construction site operators to conduct inspections as listed above. When the City performs an inspection on a construction site, the City's inspectors will check these self-inspection records. Construction site operator shall keep self-inspection records onsite for City review.

Self-inspection checklists will be issued in paper form and in conjunction with all construction permits issued at the city offices. The city building inspector will verify these records periodically while the site is active.

Note: The 2-year, 24-hour storm event for Carterville has a rainfall depth of 3.86 inches, according to NOAA's Atlas 14, Volume 8, Version 2.

#### **4.4.F Inventory of Active Construction Sites**

*The MS4 Operator shall maintain an inventory of active public and private land disturbance sites, as defined in Section 4.4 of this permit. This may be supplemented with records such as a plan review checklist and email correspondence.*

The City of Carterville will maintain an inventory of active public and private land disturbance sites covered under this permit. The inventory will be kept on a paper map posted at City Hall.

Inventory information for each active site contains the following:

1. Relevant contact information for each project (e.g., tracking number, name, address, phone, etc.);
2. Size of the project/ area of disturbance;
3. If the site is a priority site/ how high of priority;

#### **4.4.G Tracking of Oversight Inspections**

*The MS4 Operator shall track their oversight inspections. This may be done by retaining copies of records such as inspection checklists and email correspondence. The MS4 Operator must make these inventories available to the Department upon request.*

The City of Carterville will track oversight inspections (from 4.4.E) by retaining copies of records of inspection checklists and email correspondence. These inventories are available to the Department upon request.

Tracking contains:

1. Inspection dates and time;
2. Inspector name
3. Inspection findings; and,
4. Follow-up actions and dates, including corrective actions and enforcement actions.

#### **4.4.H Review/Update of Construction Site Runoff Control Program for Existing Permittees**

*Review the Stormwater Management Program including ordinances, permitting procedures, review procedures, inspection procedures and enforcement procedures to ensure compliance with these requirements. Any changes necessary to be in compliance with this permit shall be completed within the first year of this permit issuance.*

*The inventory of active sites must be updated as new projects are reviewed and projects are completed. If the MS4 Operator needs to develop this inventory, it shall be completed within one (1) year of this permit issuance*

The City of Carterville has adopted the appropriate regulatory mechanisms (ordinances and Stormwater Management Criteria Manual) in March 2024. The city has also developed a plan review checklist, an inspection checklist, and will begin keeping the inventory of active construction sites.

**4.4.I** The City of Carterville is not a new permittee, so 4.4.I is not applicable.

#### **4.4.J Public Comment About Land Disturbance Sites**

*The Stormwater Management Program must include procedures for the MS4 Operator to receive and consider information submitted by the public about land disturbance sites. This may be in combination with 4.2.D of this permit.*

Construction plans are available at Carterville's City Hall for review by the public. Any citizen of Carterville may submit written comments relating to the plans. Written comments can be submitted in person or by mail, or email to William Cline, City Administrator, at City Hall ([admin@cartervillemo.com](mailto:admin@cartervillemo.com)). Comments are to be tracked electronically or on paper by Mr. Cline. Comments are to be addressed by the City within 30 days of receipt.

#### **4.4.K Training for Inspection Staff**

*The MS4 Operator shall provide, or support access to, construction site runoff control training for MS4 inspectors and plan reviewers at minimum once during this permit cycle. This education shall be tracked or documented.*

The City of Carterville will provide construction site runoff control (including erosion and sediment control) training to all construction inspection staff and plan reviewers at least once during the permit cycle. Records of this training will be kept with other staff training records under section 4.6 of this SWMP. Reviews of training effectiveness will also be kept under section 4.6.

#### **4.4.L Inspection Procedures**

*The MS4 Operator must provide written procedures outlining the local inspection and enforcement procedures to their inspectors to ensure consistency among the inspections.*

An erosion control inspection will be provided during each inspection requested by the owner, contractor, or subcontractor. A checklist is used for these stormwater inspections. The

completed inspection checklists are kept at City Hall. A copy of the stormwater inspection sheet/checklist will be included with Appendix MCM 4.

Enforcement procedures for construction site runoff problems are laid out in the regulatory mechanism.

#### 4.4.M Adaptive Management

*Using adaptive management, all MS4 Operators shall review, at minimum annually, their Construction Site Stormwater Runoff Control Program and evaluate the ordinances, review procedures, inspection procedures, enforcement procedures, receipt of public information procedures, and effectiveness of training procedures to ensure compliance with these requirements and determine if changes are needed.*

*This annual review may include but is not limited to the follow.*

1. *Evaluating the most common violations, how the violations are handled, how many are escalated;*
2. *If the education program can assist in reducing violations;*
3. *Determining if the site plans match the sites when violations arise or if additional items need to be evaluated at plan review;*
4. *Assessing public complaints being addressed in a timely manner; and*
5. *Evaluating if the inspections are thorough and consistent across different sites.*

Annual Review of MCM 4			
Year reviewed	Date of review	Reviewer(s)	Were changes made and noted?
2021	1-31-2022	William Cline	No changes were made at this time.
2022	1-5-2023	William Cline	Council fail to come to a consensus on adoption of a preconstruction/land disturbance ordinance. Expected in early 2024.
2023	1-7-2024	William Cline	The city will be adopting a new stormwater management ordinance at March 2024 council.
2024		William Cline	The city has adopted a new stormwater management ordinance with enforcement actions (3/12/24).
2025			

Table MCM4. Construction Site Stormwater Runoff Control Program BMPs

Stormwater Goal (BMP)	Permit Section	Implementation Date	Update Frequency	Responsible Party	Measurable Goal	Tracking
<b>Regulatory Mechanism and Enforcement</b>						
Regulatory Mechanism - Erosion & Sediment Control Ordinance & Stormwater Mgmt. Criteria Manual	4.4.A 4.4.D	March. 2024	As needed	City Administrator	Adopt, then enforce the required Stormwater Regulations. Maintain enforcement procedures included in Ordinance & Manual.	Completed
<b>Pre-Construction Plan Review</b>						
Pre-Construction Plan Reviews	4.3.A	Sept. 2022	As needed	City Administrator	Review all qualifying site plans for compliance with Stormwater Regulations.	Track # of plans reviewed and # approved.
Adopt Plan Review Checklist and Use for Future Construction Projects	4.4.B	March. 2024	As needed	City Administrator	Adopt & use a checklist to ensure consistency and completeness during Plan Review process.	Keep copies of checklists used for each plan review.
Public Comments	4.4.J	Start in Sept. 2022	Ongoing	City Administrator	Make all active plans available at City Hall for review by public. Accept written comments submitted and address within 30 days.	Keep records of comments submitted and addressed.
<b>Inspection</b>						
Construction Site Inspection by City	4.4.C	Start in Sept. 2022	Ongoing	Building Inspector	Inspect all permitted, active construction sites for compliance with Stormwater Regulations and site's SWPPP (including self-inspections).	Inspections tracked by keeping Inspection Sheets on file.
Create Stormwater Inspection Sheet	4.4.C	March. 2024	As needed	City Administrator	Create one Stormwater Inspection Sheet.	Added to SWMP.
Use Stormwater Inspection Checklist during Construction Site Inspections	4.4.C	On day of inspection. Start in Sept. 2022	Ongoing	Building Inspector	Use Stormwater Inspection Sheet to ensure complete, consistent inspection of each permitted construction site.	Use Inspection Sheet for each inspection. Keep on file.
City Oversight of Self-Inspection by Construction Site Operators	4.4.E	Start in Sept. 2022	Ongoing	Building Inspector	Provide oversight to check that self-inspections are properly completed by the construction site operators for all permitted sites. (See 4.4.E above for details.)	Keep copies of oversight records, whether submitted by operator or verified by City inspection.
Create and Maintain Inventory of Active Construction Sites	4.4.F	Start in Sept. 2022	Ongoing	City Administrator	Maintain Inventory of all Active Construction Sites. (Include Contact Info, Size of disturbance area, priority level.)	Are all regulated active construction sites included in inventory?
<b>Education/ Training/ Review</b>						
Erosion & Sediment Control Training for Inspection Staff & Plan Reviewers	4.4.K	2022	As needed	City Administrator	Provide Erosion & Sediment Control Training for Inspection Staff & Plan Reviewers at least once per permit cycle.	Track names/number of staff trained in section 4.6.A & 4.6.B of the SWMP.
Annual Review of MCM 4	4.3.R	Each January	Each January	City Administrator	Perform annual review of MCM 4 BMPs.	Note review date and any changes in section 4.4.M of SWMP document.

## **4.5 MCM 5. Post-Construction Stormwater Management in New Development and Redevelopment**

Carterville has implemented and is enforcing a program to address the water quality of long-term stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan or sale. The City will accomplish this goal through a stormwater management ordinance requiring any such development project to obtain a Grading Permit, discussed below, before construction may begin.

The City's stormwater program will ensure that permanent controls have been designed and implemented to prevent or minimize water quality impacts.

### **4.5.A Regulatory Mechanism**

*The MS4 Operator shall maintain and utilize an ordinance(s) or other regulatory mechanism(s) to address post-construction runoff from new development and redevelopment projects to the extent allowable under state or local law for sites equal to or greater than one acre including projects less than one acre that are part of a larger common plan of development or sale.*

The City of Carterville has adopted a regulatory mechanism to prevent or minimize long-term water quality impacts. This regulatory mechanism (adopted March 2024) will combine ordinances and a Stormwater Management Criteria Manual to:

- Lay out procedures for acquiring a Grading Permit;
- Require long-term maintenance of permanent BMPs.
- Establish legal authority for the City to inspect permitted construction sites and long-term, permanent BMPs;
- Establish legal authority for the City to enforce the regulations through denial of permit, stop-work orders, revocation of permit, and criminal charges, with associated fines and other penalties.

The City will regulate sites that disturb one or more acres of land, as well as those sites that disturb less than one acre if the disturbance is part of a larger common plan of development or sale that would disturb one acre or more.

### **4.5.B Minimization of Water Quality Impacts**

*The MS4 Operator shall continue or develop a strategy to minimize water quality impacts. This shall include a combination of structural and/or non-structural controls (BMPs) appropriate for the permittee's community.*

#### **1. Structural Controls:**

The Stormwater Management Criteria Manual contains provisions for structural stormwater controls. These structural controls include extended detention basins, grass swales, permeable surfaces, sand filter basins, and other structural BMPs. The Manual includes design standards and guidance for designing, installing, implementing, and maintaining stormwater control measures that are designed to infiltrate, evapotranspire,

harvest, detain, retain, and/or reuse stormwater. Design standards in the Manual include regulation of site discharge volumes, rates, durations, and frequency for new development and redevelopment sites, with the intent to minimize the impact of stormwater runoff on water quality.

## 2. Non-Structural Controls:

The Stormwater Management Criteria Manual contains guidelines and rules for non-structural stormwater controls. Through this mechanism, the City adopted preventative actions that involve management and source controls. Specific measures/policies/ include:

- Policies and ordinances that provide requirements and standards to direct development to identified areas;
- Protection of sensitive areas such as wetlands and riparian areas;
- Maintain and/or increase open space (which may include a dedicated funding source for open space acquisition);
- Encourage buffer zones along water bodies;
- Minimization of disturbance of soils and vegetation;
- Use of green infrastructure; and
- Minimization of directly connected impervious areas.

### **4.5.C Pre-Construction Plan Review**

*Pre-construction plan review shall be conducted by the MS4 Operator to assess site characteristics at the beginning of the construction site design phase to ensure adequate planning for stormwater program compliance. The structural or non-structural controls chosen shall; protect sensitive areas, minimize the creation of stormwater pollution, and effectively reduce stormwater pollution. This can be achieved by reasonably mimicking pre-construction runoff conditions on all affected new development projects, or the permittee may achieve this goal through a method more appropriate for its community.*

The City of Carterville will perform pre-construction plan review for developments covered under this MS4 permit. This review will be performed in conjunction with the review required under MCM 4. During review, the City, or its agent, will utilize a checklist to ensure consistency and completeness. Non-structural BMPs (such as comprehensive plans, zoning ordinances, buffer strips, and/or maximization/preservation of open space) will be evaluated first.

(Copy of this checklist has been included under Appendix MCM 4)

### **4.5.D Long-Term Maintenance of Permanent Stormwater BMPs**

*The MS4 Operator shall have ordinances or similar enforcement mechanisms to ensure adequate long-term operation and maintenance (O&M) of the selected BMPs, including, as appropriate, agreements between the MS4 Operator and other parties such as post-development landowners or regional authorities.*

The City of Carterville has adopted an ordinance as the regulatory mechanism requiring appropriate long-term operation and maintenance of permanent BMPs.

Long-term O&M for BMPs will be addressed during the plan review and approval process. Copies of O&M information are to be retained by the party responsible for the post-construction BMP and by the City.

#### **4.5.E Long-Term BMP Inspections**

*The MS4 Operator shall inspect, or require inspection of, each water quality structural and non-structural water post-construction BMP according to the following at minimum:*

- 1. A minimum of one (1) inspection shall be conducted during construction, and one (1) inspection before the site is finalized, to verify water quality facilities are built as designed and any applicable boundaries or practices for non-structural BMPs are being observed. This may be conducted in combination with MCM 4 inspections. (The MS4 inspector shall have access to the approved plans to ensure proper installation.)*
- 2. A minimum of once in the first three years after the installation, by the MS4 Operator.*
- 3. Annually by the MS4 Operator.*
- 4. The MS4 Operator shall inspect a minimum of 60% of all water quality post-construction BMPs within the five year permit cycle. This must include installations with ongoing or open enforcement issues.*

#### **4.5.F Enforcement Procedures**

*The MS4 Operator must maintain a plan designed to ensure compliance with the MS4's post-construction water quality regulatory mechanism. This plan shall include escalating enforcement mechanisms the MS4 Operator will use to ensure compliance.*

*The MS4 Operator must have the authority to initiate a range of enforcement actions to address the variability and severity of noncompliance*

Enforcement procedures for Long-Term O&M problems are laid out in the ordinance for Long-Term Maintenance of Permanent Stormwater Controls. This ordinance establishes legal authority for the City to enforce the regulations through notices of violation, criminal charges, with associated fines and other penalties. If necessary, the City may perform maintenance work at the owner's expense. Appeal procedures are also included in the ordinance.

Specific procedures for enforcement are laid out in in the ordinance. The range of enforcement actions available to the City allow it to address the variability and severity of the noncompliance. Any enforcement response by the City takes into account the:

1. Degree and duration of the violation;
2. Effect the violation has on the receiving water;
3. Compliance history of the post-construction BMP owner or operator; and
4. Cooperation of the owner or operator with compliance efforts.

The enforcement procedures may start with verbal notice, and education regarding the BMP, before continuing to the Notice of Violation. Enforcement actions will begin within 30 days of discovery of the violation.



#### **4.5.G Enforcement Timeline**

*Enforcement actions shall be timely in order to ensure the actions are effective. The MS4 Operator shall begin enforcement actions within thirty (30) days of discovering a violation.*

Specific procedures for enforcement, including timelines, are laid out in the ordinance for Long-Term Maintenance of Permanent Stormwater Controls. The enforcement procedures may start with verbal notice, and education regarding the BMP, before continuing to the Notice of Violation stage, but the actions will begin within 30 days of discovery of the violation.

#### **4.5.H Inventory of BMPs**

*The MS4 Operator shall maintain an inventory tracking the water quality post-construction BMPs. This inventory must contain, at a minimum:*

- 1. Relevant contact information for the responsible person(s) or entity (e.g., tracking number, name, address, phone, etc.);*
- 2. The type of post-construction BMP;*
- 3. Applicable operations and maintenance documents;*
- 4. Date the MS4 Operator approved the construction site plan; and,*
- 5. If the water quality facility is owned or operated by the MS4, the tracking shall also include any maintenance, such as sediment clean-out or replanting.*

The City of Carterville will develop an inventory of BMPs within two years of permit issuance (by September 2023). The inventory will be updated as new facilities are added and projects are completed.

#### **4.5.I Tracking Post-Construction BMP Inspections**

*The MS4 Operator shall also track the post-construction BMP inspections. This may be done by retaining copies of records such as inspection checklists and email correspondence. The MS4 Operator must make these inventories available to the Department upon request. The tracking must contain at a minimum:*

- 1. Inspection dates and time;*
- 2. Inspector name;*
- 3. Inspection findings; and F*
- 4. Follow up actions and dates, including corrective actions and enforcement actions.*

The City of Carterville have developed a method for tracking BMP inspections as it implemented the Post-Construction BMP Inspection Program from 4.5.E. This will be continued throughout the permit period.

#### **4.5.J Review/Update of Post-Construction BMP Program for Existing Permittees**

*Evaluate the ordinances, permitting procedures, review procedures, inspection procedures and enforcement procedures to ensure compliance with these requirements and determine if changes are needed. Any changes necessary to be in compliance with this permit shall be completed within the first two (2) years of permit issuance.*

*The inventory of water quality facilities must be updated as new facilities are added and projects are completed. If the MS4 Operator needs to develop this inventory, it shall be completed within two (2) years of this permit issuance.*

The City of Carterville has adopted the appropriate regulatory mechanisms (ordinances and Stormwater Management Criteria Manual) in March 2024. The City is keeping an inventory of permanent BMPs and checklists for plan review, construction inspections, and maintenance inspections.

**4.5.K** The City of Carterville is not a new permittee, so 4.5.K is not applicable.

**4.5.L Training for Inspection Staff**

*The MS4 Operator shall provide appropriate training for MS4 inspectors at minimum once every permit cycle. This may include Green Infrastructure training, or specific operation of proprietary post-construction BMPs. The MS4 shall provide overall training to explain the function of both structural and non-structural post-construction water quality BMPs.*

The City of Carterville will provide post-construction BMP inspection training to all relevant inspection staff at least once during the permit cycle. Records of this training will be kept with other staff training records under section 4.6 of this SWMP. Reviews of training effectiveness will also be kept under section 4.6.

**4.5.M Adaptive Management**

*Using adaptive management, all MS4 Operators shall review, at minimum annually, their Post-Construction Site Stormwater Management in New Development and Redevelopment Program and evaluate effectiveness of the overall program and determine if changes are needed.*

*This annual review may include but is not limited to the following.*

- 1. Reviewing the number and types of developments;*
- 2. How many BMPs were installed/inspected;*
- 3. The amount of watershed area being treated;*
- 4. The types of violations found and how frequently; and*
- 5. Evaluating how education could improve the effectiveness of the program.*

*Any additional programmatic BMPs shall be acknowledged in the Stormwater Management Program Report. (Examples of programmatic BMPs include; educational meetings with HOAs, onsite educational visits, adopting a standard operating procedure for enforcement measures.)*

See table on next page.

Annual Review of MCM 5			
Year reviewed	Date of review	Reviewer(s)	Were changes made and noted?
2021	1-31-2022	William Cline	No changes were made at this time.
2022	1-5-2023	William Cline	No changes were made at this time.
2023	1-7-2024	William Cline	Post construction checklist and ordinance is being drafted
2024			
2025			

Table MCM5. Post-Construction Stormwater Management Program BMPs

Stormwater Goal (BMP)	Permit Section	Implementation Date	Update Frequency	Responsible Party	Measurable Goal	Tracking
<b>Regulatory Mechanism and Enforcement</b>						
Regulatory Mechanism - Stormwater Management Criteria Manual & Long-Term Maintenance Stormwater Ordinance	4.5.A 4.5.B 4.5.D 4.5.F 4.5.G	March. 2024	As needed	City Administrator	Adopt, then enforce existing Stormwater Regulations. Maintain enforcement procedures included in Ordinance & Manual. Regs include minimization of Water Quality Impacts and Long-Term Maintenance of Permanent BMPs.	Completed
<b>Pre-Construction Plan Review</b>						
Pre-Construction Plan Reviews	4.5.C	Apr. 2024	As needed	City Administrator	Review all qualifying site plans for compliance with Stormwater Regulations.	Track # of plans reviewed and # approved.
Adopt Plan Review Checklist and Use for Future Construction Projects	4.5.C	Apr. 2024	As needed	City Administrator	Adopt & use a checklist to ensure consistency and completeness during Plan Review process.	Keep copies of checklists used for each plan review.
<b>Construction Phase</b>						
Construction Site Inspection by City	4.5.E	Start in Sept. 2022	As needed	Building Inspector	Inspect all permitted, active construction sites for compliance with Stormwater Regulations and approved plans.	Inspections tracked by keeping Inspection Sheets on file.
<b>Long-Term Maintenance of Permanent Stormwater BMPs</b>						
Develop and Maintain Inventory of Permanent Stormwater BMPs	4.5.H	Sept. 2023	At close of Construction	City Administrator	Develop & maintain Inventory of all Permanent Stormwater BMPs. (Include Contact Info, Size of disturbance area, priority level.)	Are all regulated active construction sites included in inventory?
Develop/Adopt Inspection Checklists for Each Type of Permanent BMP	4.5.C 4.5.I	Sept. 2023	As needed	City Administrator	Develop or adopt checklists for each type of Permanent Stormwater BMP.	Inspections sheets developed. Add to SWMP.
Initial Post-Construction Inspection by City	4.5.E 4.5.I	Fall 2023	As needed	Building Inspector	Inspection by City of all Permanent Stormwater BMPs within first 3 years after construction is complete. (After checklists are developed.)	Inspections tracked by keeping Inspection Sheets on file.
Annual Inspections of Permanent Stormwater BMPs, by City or Owner	4.5.E 4.5.I	Fall 2023	Repeat Annually	Building Inspector	Annual Inspections of each Permanent BMP by Owner or City (depending on agreement). City to provide Inspections checklists to Owner.	Inspections tracked by keeping Inspection Sheets on file. Owner to submit completed Inspection Sheets to City.
<b>Education/ Training/ Review</b>						
Post-Construction BMP Inspection Training for Inspection Staff	4.5.L	2022	As needed	City Administrator	Provide Post-Construction BMP Inspection Training for relevant Inspection Staff at least once per permit cycle.	Track names/number of staff trained in section 4.6.A & 4.6.B of the SWMP.
Annual Review of MCM 5	4.5.M	Each January	Each January	City Administrator	Perform annual review of MCM 5 BMPs.	Note review date and any changes in section 4.5.M of SWMP document.





## **Stormwater Program Training Schedule**

1. In-Depth Training for Pollution Prevention/Good Housekeeping (PPGH) – MCM6
  - a. Frequency: ANNUAL
  - b. Topics: See table in section 4.6.B.
  - c. Applicable Staff :
    - i. Building maintenance/custodial staff
    - ii. Fleet maintenance staff;
    - iii. Staff at facilities with fuel, chemicals, washing of vehicles or equipment;
    - iv. Road maintenance staff;
    - v. Road salt/de-icing staff; and
    - vi. Parks, swimming pool, or golf course staff who encounter spills, equipment or vehicle washing, fueling, chemicals, etc.
  
2. General Training for Pollution Prevention/Good Housekeeping – MCM6
  - a. Frequency:
    - i. Existing Employees: Initial training
    - ii. New Employees: Within one year of being hired
    - iii. Additional training as needed.
  - b. Applicable Staff: All employees not listed in number 1 above.
  
3. Illicit Discharge Detention and Elimination (IDDE) Training – MCM3
  - a. Frequency:
    - i. Existing Employees: Initial training
    - ii. New Employees: Within one year of being hired
  - b. Applicable staff include:
    - i. IDDE inspection staff;
    - ii. Building inspection staff;
    - iii. Construction inspection staff;
    - iv. Fleet maintenance staff;
    - v. Staff at facilities with fuel, chemicals, washing of vehicles or equipment;
    - vi. Road maintenance staff;
    - vii. Road salt/de-icing staff; and
    - viii. Parks, swimming pool, or golf course staff who encounter spills, equipment or vehicle washing, fueling, chemicals, etc.
    - ix. Police
  
4. Training for Construction Site Runoff Control & Post-Construction Stormwater Management – MCM4 & MCM5
  - a. Frequency: Once per permit cycle (Sept 2021-August 2026)
  - b. Applicable staff include:
    - i. Construction Inspection staff;
    - ii. Inspection staff for Long-Term BMP inspections

#### 4.6.B Minimum Topics Covered

*The training shall be used to prevent and reduce stormwater pollution.*

*The training shall cover a minimum of the following topics/ activities (if applicable to the MS4):*

The table below provides a breakdown of topics to be covered in the In-Depth Training for PPGH and the IDDE Training (#1 & #3 of the updated Training Program Schedule). As training is provided, records will be kept in the table.

Training Program – Minimum Topic Breakdown			
Topic	Years covered in training	Departments trained	Number of staff trained
1. Vehicle and equipment washing			
2. Fluid disposal and spills			
3. Fleet, equipment, and building maintenance			
4. Park and open space maintenance procedures (including fertilizer, herbicide, pesticide application)			
5. New construction, road maintenance, and land disturbances			
6. Stormwater system maintenance			
7. MS4 operated salt and de-icing operations			
8. Fueling			
9. Solid waste disposal			
10. Street sweeper operations			
11. Illicit Discharges			



#### **4.6.C Training Materials & Procedures**

*The MS4 Operator shall:*

- 1. Maintain material to use in the training program, such as those available from the EPA, the state, or other organizations.*
- 2. Maintain written procedures for the training program. Include a description of how this training will coordinate with all other minimum control measures (such as Illicit Discharge), monitoring and TMDL implementations where applicable.*
- 3. Maintain a written schedule to offer topic specific training when it is appropriate. Such as, swimming pool discharges in the summer, leaf disposal in the fall, proper salt clean-up and usage in the winter.*

The City of Carterville is in the process of updating its current training program and schedule to meet the requirements of the new MS4 permit. Training will be provided either in-person or by electronic methods. Training materials will be identified and then recorded for use again in the future. Coordination with other MCMs is shown in the updated Training Program Schedule above. Seasonally appropriate topics for employees may be covered through email or in-person training, as deemed necessary.

#### **4.6.D List of Municipal Operations/Facilities**

*The MS4 Operator shall maintain a list of all municipal operations/facilities that are impacted by this operation and maintenance program.*

The following is a list of all municipal operations and facilities that are impacted by the O&M program.

- City Hall/Police Department - 1200 E 1st street
- Public Works Facility - 310 S Tennessee
- Comet Park - 400 W Main
- Garrett Park - 500 N Pine

#### **4.6.E List of Industrial Facilities Owned and/or Operated by the City**

*The MS4 Operator shall maintain a list of industrial facilities the MS4 Operator owns or operates which are subject to NPDES permits for discharges of stormwater associated with industrial activity. The list shall include the permit number or a copy of the No Exposure Exemption Certification (if applicable) for each facility.*

*This includes Municipal projects with a land disturbance permit, wastewater facilities, airports, etc.*

*NPDES permitted facilities not owned or operated by the permittee are not required to be part of the list, however the MS4 Operator should be familiar with all such facilities in their MS4 service area as they may signify a priority area for the IDDE program.*

The following are industrial facilities owned and/or operated by City of Carterville.

- Carterville Water Well #1 & Tower MO5010141  
Carterville Water Well #2  
Carterville Sewer lift station

#### **4.6.F Controls for Reducing or Eliminating Floatables and Pollutant Discharge**

*The MS4 Operator shall develop or maintain controls for reducing or eliminating the discharge of floatables and pollutants from municipal facilities listed in Section 4.6.D and 4.6.E.*

The City of Carterville utilizes an Operation and Maintenance Manual for Municipal Operations as a guide for the prevention and reduction of pollution in stormwater runoff from municipal facilities and operations. The Municipal O&M Manual will include the following:

1. A list of potential pollutant sources at each facility, such as materials used and stored on site.
2. Minimum of annual inspections of all municipally owned or operated facilities for stormwater issues are to begin once checklists are developed for each facility.
  - a. Records will be kept for inspections and follow up. This will mostly be checklists, once they are developed.
3. Use of structural controls/BMPs to reduce or prevent pollutants from entering waters of the state or into another MS4 where needed.
  - a. A map with descriptions of these BMPs will be maintained for each facility, once it is developed.
4. All paints, solvents, petroleum products, and petroleum waste products (except fuels) under the control of the City are stored so these materials are not exposed to stormwater.
5. Sufficient practices of spill prevention, control, and/or management are provided to prevent any spill of these pollutants from entering waters of the state;
  - a. This includes spill kits when liquid product is stored at a facility; and
  - b. Any containment system used to implement this requirement is constructed of materials compatible with the substances contained and also prevents the contamination of groundwater.
6. Tracking of rock salt/brine or other deicer usage.
7. Maintaining municipal salt storage area(s) after use of rock salt, at minimum:
  - a. Sweep and/or shovel spillage in loading area and storage area, and
  - b. Unload salt hoppers or keep under cover when salt is in the hopper.

By September 2022, City of Carterville will develop the following items:

- The Municipal Operation and Maintenance Manual
- Inspection Checklists for each municipal facility listed in the O&M Manual.
- Maps of BMPs at each municipal facility listed in the O&M Manual.

A digital copy of the O&M Manual will be made available on the City's Stormwater website (<https://cartervillemo.com/storm-water>).

#### **4.6.G Procedures for Proper Disposal of Waste**

*The MS4 Operator shall have procedures for proper disposal of waste removed from the MS4 structures and areas of jurisdiction. This waste, shall include at minimum, if applicable to the permittee:*

1. *Street sweeper spoils and washout;*
2. *Accumulated sediment;*
3. *Dredged materials;*
4. *Floatables, trash and litter;*

5. *Leaves, other organic matter; and*
6. *Other debris.*

The above topics will be included in the Municipal O&M Manual. A digital copy of the O&M Manual will be made available on the City's Stormwater website (<https://cartervillemo.com/storm-water>).

#### **4.6.H Washing of Municipal Vehicles and Equipment**

*The MS4 Operator shall maintain and utilize the following procedures, at minimum, for the washing of all municipal vehicles and equipment (if applicable to the MS4):*

1. *Use of any soap or detergent shall only be where there is connection to sanitary sewer or equivalent treatment; and*
2. *Any wash or rinse water that contains pollutants such as salt, oils, grease, sediment, grass clippings, lawn chemicals, or pesticides shall not be discharged to waters of the state or the MS4 system without appropriate treatment.*
3. *Any washing or rinsing activities shall be conducted in an appropriate area so the water is treated. This area(s) shall be marked on the map of the facility.*

Vehicle and equipment washing will be covered in the Municipal O&M Manual. A digital copy of the O&M Manual will be made available on the City's Stormwater website.

#### **4.6.I Written Controls, Procedures, Inspection Schedules, Tracking, Annual Review**

*The MS4 Operator shall maintain written explanation of the controls, procedures, inspection schedules, and explanation of tracking of these controls. Tracking may be done by retaining inspection reports or checklists. Individual Stormwater Pollution Prevention Plans (SWPPP) or one overarching Operations and Maintenance Manual (O&M Manual) for all applicable MS4 facilities may be used to comply with this requirement.*

*Annually, the MS4 Operator shall evaluate the results, controls, and inspection procedures to ensure compliance with these requirements and determine if changes are needed. This evaluation may also aid in finding priority areas or pollutants in relation to MCM 3, or adding more education in relation to MCM 1.*

Written explanations of controls, procedures will be included in the municipal O&M Manual. A digital copy of the O&M Manual will be made available on the City's Stormwater website (<https://cartervillemo.com/storm-water>).

Facility inspections checklists will be developed by September 2022 and initial inspections of all facilities will be conducted by the end of 2022. After this, annual inspections will continue throughout the permit period. Tracking will be accomplished by retaining inspection checklists.

The City will perform an annual review of the Pollution Prevention/Good Housekeeping Program to ensure MS4 compliance and determine if changes are needed. This review will take place during the preparation of the annual MS4 Stormwater Report. Annual reviews will be recorded in the following table.



**4.6.J Flood Management Projects**

*The MS4 Operator shall maintain procedures to determine if there are impacts to water quality for new flood management projects, if applicable. Any flood management projects shall require the protection of water quality in the standards that are used to plan, design, build, and maintain stormwater infrastructure. Flood management projects are those projects developed or designed to reduce flooding.*

Water quality impact of flood management projects will be covered in the proposed municipal O&M Manual.

Flood management projects in the Plan Area can include:

- Regional storm water control (retention basins, detention basins);
- Flood control levees and associated pump stations;
- Storm water drainage conveyance capacity improvements;
- Projects involving land buyouts; and
- Designated uses of floodplain land.

Have there been any such flood management projects to review?		
Year	Yes/no	If yes, the location(s)
2021	No	
2022	No	
2023	No	
2024		
2025		

**4.6.K Review/Update of Pollution Prevention/Good Housekeeping Program for Existing Permittees**

*Existing permittees: Shall evaluate the current Stormwater Management Program including training, inspection procedures, and other municipal operation procedures to ensure compliance with these requirements. Any changes necessary to be in compliance with this permit shall be completed within one (1) year of this permit issuance.*

The City of Carterville will develop/implement the missing items from all of section 4.6 within one year of permit issuance (by September 2022).

**4.6.L** The City of Carterville is not a new permittee, so 4.6.L is not applicable.

**4.6.M Adaptive Management**

*Using adaptive management, all MS4 Operators shall review their Municipal Operations Program, at minimum, annually and update implementation procedures as necessary within the permit requirement.*



Annual Review of MCM 6			
Year reviewed	Date of review	Reviewer(s)	Were changes made and noted?
2021	1-31-2022	William Cline	No changes were made at this time.
2022	1-5-2023	William Cline	No changes were made at this time.
2023	1-7-2024	William Cline	Included O&M manual in SWMP
2024			
2025			

Table MCM6. Pollution Prevention/ Good Housekeeping Program BMPs

Stormwater Goal (BMP)	Permit Section	Implementation Date	Update Frequency	Responsible Party	Measurable Goal	Tracking
<b>O&amp;M Manual</b>						
Create and Follow an Operation & Maintenance Manual for Municipal Operations	4.6.D 4.6.E 4.6.F 4.6.G 4.6.H 4.6.I 4.6.J	Jan. 2024	As needed	City Administrator	Create an Operation & Maintenance Manual for Municipal Operations as a guide for the prevention and reduction of pollution in stormwater runoff from municipal facilities and operations.	O&M Manual complete
<b>Facility Inspections</b>						
Develop PPGH Inspection Checklists and BMP Maps for Each Municipal Facility	4.6.I	Jan. 2024	As needed	City Administrator	Develop PPGH Inspection Checklists for each municipal facility. Develop map of each facility's BMPs.	Added Inspection Checklists and Maps to O&M Manual.
PPGH Inspections for Each Municipal Facility	4.6.1	Fall 2022	Repeat Annually	Building Inspector	Use PPGH Inspection Checklists & maps to perform annual inspections of each municipal facility.	Inspections tracked by keeping Checklists on file.
<b>Education/ Training/ Review</b>						
Develop/Identify Appropriate Staff Training Material for MCMs 3, 4, 5, & 6. Keep records of material used for later reuse.	4.6.A 4.6.B 4.6.C 4.3.Q 4.4.K 4.5.L	Summer 2022	As needed	City Administrator	Develop/Identify Appropriate Staff Training Material for MCMs 3, 4, & 5. (See listed SWMP sections.) Keep records of material used for later reuse.	Record training material used.
Implement Updated Staff Training Program	4.6.A 4.6.B 4.3.Q 4.4.K 4.5.L	Fall 2022	As needed	City Administrator	Provide stormwater training for City staff according to the Stormwater Program Training Schedule on <u>4.6 page 3</u> . Training frequency and topics are listed on the Schedule.	Track names/number of staff trained in section 4.6.A & 4.6.B of the SWMP.
Annual Review of MCM 6	4.6.M	Each January	Each January	City Administrator	Perform annual review of MCM 6 BMPs.	Note review date and any changes in section 4.6.M of SWMP document.



# Part 5 – Monitoring, Recordkeeping, and Reporting

## 5.2 Recordkeeping

*All records required by this permit may be maintained electronically, as long as they are accessible upon request by the Department. If a non-electronic version is kept, the permittee shall retain the most recent versions of the records and shall be accessible to the Department upon request.*

## 5.3 MS4 Stormwater Management Program Report

- A. A report to the Department on the status of the MS4's program is **due annually on** or before **February 28th**. This report shall cover the previous year from **January 1<sup>st</sup> to December 31<sup>st</sup>**. The report shall be submitted on the Department approved, MS4 Stormwater Management Program Report form. If approved by the Department, permittees may submit the MS4 Stormwater Management Program Report using an alternative report format.
  
- B. The annual reports must be submitted through the eDMR system. This is accessible through the Missouri Gateway for Environmental Management (MoGEM): <https://dnr.mo.gov/mogem/>

Which City Staff have access to the eDMR system?	
NAME	Role in the eDMR system
William Cline	Community Official
Carze Brown	Certifier
Sarah Simon (Allgeier, Martin & Associates, Inc.)	Preparer

# APPENDIX MCM 1

## PUBLIC EDUCATION & OUTREACH SUPPORTING DOCUMENTS

# Website content at [www.cartervillemo.com](http://www.cartervillemo.com)



PUBLIC WORKS DEPARTMENT

- [Drinking Water](#)
- [Sewer system](#)
- [Solid Waste & Recycling](#)
- [Parks & Recreation](#)
- [Storm Water Management](#)

## STORM WATER MANAGEMENT



## CARTERVILLE IS AN MS4 COMMUNITY



Polluted storm water runoff is commonly transported through municipal separate storm sewer systems (MS4s), and then often discharged, untreated, into local water bodies.

An MS4 is a conveyance or system of conveyances that is:

- owned by a state, city, town, village, or other public entity that discharges to waters of the U.S.,
- designed or used to collect or convey stormwater (e.g., storm drains, pipes, ditches),
- not a combined sewer, and
- not part of a sewage treatment plant, or publicly owned treatment works (POTW).

To prevent harmful pollutants from being washed or dumped into MS4s, certain operators are required to obtain NPDES permits and develop stormwater management programs (SWMPs). The SWMP describes the stormwater control practices that will be implemented consistent with permit requirements to minimize the discharge of pollutants from the sewer system.

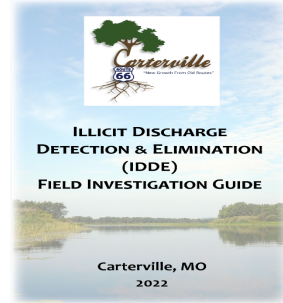
[REPORT A STORM WATER CONCERN OR VIOLATION](#)

## Current Storm Water Management Plan

2022 2026 Carterville SWMP.pdf

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## Annual Report

[Download PDF](#)

RESOURCE DEPARTMENT OF NATURAL RESOURCES WATER PROTECTION PROGRAM MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) STORMWATER MANAGEMENT PLAN REPORT		FOR OFFICE USE ONLY
<b>Part A - MS4 PERMIT HOLDER INFORMATION</b> 1. NAME: Carterville Phase II MS4 2. TYPE OF MS4: MCRSIC 3. MS4 ID NUMBER: MCRSIC002 4. ADDRESS: 1200 East 1st Street, Carterville, MO 64833 5. PHONE NUMBER: 417-673-1341 6. E-MAIL: admin@cartervillemo.com 7. NAME OF CONTACT PERSON: William Chiu, City Administrator 8. If there are any areas of a MS4 basin added or removed from the MS4 jurisdiction, describe or attach legal notices sent to the permittee concerning the addition, removal, or modification, or have record copies of stormwater management plan report.		9. DATE OF REPORT: 12/31/2021 10. DATE OF NEXT REPORT: 12/31/2022
<b>Part B - REPORTING PERIOD</b> 1. Is your MS4 subject to a TMDL? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, you are required to submit the MS4 report annually. Reports are due Feb. 28 each year. For the first reporting period, the reporting date will be June 15, 2018 and the ending date will be Dec. 31, 2019. All other annual reports shall cover the reporting period of Jan. 1 to Dec. 31 each year. 2. Is your MS4 now permitted to discharge to a TMDL? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, you are required to submit the MS4 stormwater management plan report annually. Reports are due Feb. 28 each year. For the first reporting period, the reporting date will be the date of issuance of the permit and the ending date will be Dec. 31, 2019. All other annual reports shall cover the reporting period of Jan. 1 to Dec. 31 each year. 3. Is your MS4 a previously permitted MS4 and not subject to a TMDL? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, you are required to submit the MS4 stormwater management plan report biennially (i.e., once every two years). Reports are due Feb. 28 every odd year. The first report will be due February 28, 2017, and all cover the reporting period from June 15, 2016 to Dec. 31, 2016. All other reports shall cover the reporting period of Jan. 1 to Dec. 31 of the second year. 4. If you are part of a permitted MS4 permit, is DMR contained in the stormwater management plan report, and one or more of the permitted MS4s also are at reporting based on the above criteria. Then submit your MS4 stormwater management plan report annually by the 28th of each year. If you are part of a permitted MS4 permit and do not submit biennial MS4 stormwater management plan report, then each MS4 permittee will submit their MS4 stormwater management plan report based on the above criteria. 5. Reporting Period: BEGINNING: January 1, 2021 ENDING: December 31, 2021 6. Reporting Period:		

1/7 | Next >

## PLEASE SUBMIT YOUR REQUEST BELOW

Name\*

Email\*

Message

[Attach Files](#) Attachments (0)

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## BETTER YET, SEE US IN PERSON!

We love our residents, so feel free to visit during normal business hours.

### CARTERVILLE

(417) 673-1341  
(417) 673-2616  
Fax # (417) 673-5448

### HOURS

Mon 08:00 am – 04:00 pm  
**Tue 08:00 am – 04:00 pm**  
 Wed 08:00 am – 04:00 pm  
 Thu 08:00 am – 04:00 pm  
 Fri 08:00 am – 04:00 pm  
 Sat Closed  
 Sun Closed

Closed from 12-1 for Lunch  
 Holidays May Effect Hours of Operation, Please Call for Holiday Hours.

Connect With Us

# APPENDIX MCM 2

## PUBLIC PARTICIPATION SUPPORTING DOCUMENTS

# APPENDIX MCM 3

## ILLICIT DISCHARGE DETECTION & ELIMINATION CHECKLISTS AND SUPPORTING DOCUMENTS

# City of Carterville

## Illicit Discharge Ordinance

BILL 10-01

ORDINANCE NO. 2795

THE COUNCIL OF THE CITY OF CARTERVILLE DOES ORDAIN AS FOLLOWS:  
Division I.

Title, Purpose and General Provisions.

### **SECTION 1. TITLE.**

This Article shall be known as the Carterville, Missouri illicit discharge control regulations and may be cited as “illicit stormwater discharge control regulations” or “regulations.”

### **SECTION 2. PURPOSE AND INTENT**

The purpose and intent of this Article is to ensure the health, safety, and general welfare of citizens, and protect and enhance the water quality of watercourses and water bodies in a manner pursuant to and consistent with the Federal Clean Water Act (33 U.S.C. §1251 et seq.) by reducing pollutants in storm water discharges to the maximum extent practicable and by prohibiting non-storm water discharges to the storm drain system.

### **SECTION 3. DEFINITIONS.**

The terms used in this Article shall have the following meanings:

- (a) Best Management Practices. Activities, practices, and procedures to prevent or reduce the discharge of pollutants directly or indirectly to the municipal storm drain system and waters of the United States. Best Management Practices include but are not limited to: treatment facilities to remove pollutants from storm water; operating and maintenance procedures; facility management practices to control runoff, spillage or leaks of non-storm water, waste disposal, and drainage from materials storage; erosion and sediment control practices; and the prohibition of specific activities, practices, and procedures and such other provisions as the City determines appropriate for the control of pollutants.
- (b) City. The City of Carterville.
- (c) Clean Water Act. The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.
- (d) Construction Activity. Activities subject to NPDES Construction Permits. These include construction projects resulting in land disturbance of 1 acres or more. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.
- (e) Hazardous Materials. Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.
- (f) Illegal Discharge. Any direct or indirect non-storm water discharge to the storm drain system, except as exempted in Division II, Section 9 of this chapter.
- (g) Illicit Connections. An illicit connection is defined as either of the following:
  - 1. Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains

and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by a government agency; or

2. Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by the City.

(h ) Industrial Activity. Activities subject to NPDES Industrial Permits as defined in 40 CFR, Section 122.26 (b)(14).

(i) Missouri Clean Water Law. RSMO Chapter 644 and any subsequent amendments thereto.

(j) National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit. A general, group, or individual permit issued by the U.S. Environmental Protection Agency (EPA) (or by a State under authority delegated pursuant to 33 USC § 1342(b)) that authorizes the discharge of pollutants to waters of the United States.

(k) Non-Storm Water Discharge. Any discharge to the storm drain system that is not composed entirely of storm water.

(l) Pollutant. Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, articles, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure (including but not limited to sediments, slurries, and concrete rinsates); and noxious or offensive matter of any kind.

(m) Pollution. The human-made or human-induced alteration of the quality of waters by waste to a degree which unreasonably affects, or has the potential to unreasonably affect, either the waters for beneficial uses or the facilities which serve these beneficial uses.

(n) Premises. Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

(o) Storm Drainage System. Publicly-owned facilities operated by the City by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures which are within the City and are not part of a publicly owned treatment works as defined at 40 CFR Section 122.2.

(p) Storm Water. Any surface flow, runoff, and drainage consisting entirely of water from rain storm events.

(q) Waters of the United States. Surface watercourses and water bodies as defined at 40 CFR § 122.2. including all natural waterways and definite channels and depressions in the earth that may carry water, even though such waterways may only carry water during rains and storms and may not carry storm water at and during all times and seasons.

#### **SECTION 4. APPLICABILITY.**

This Article shall apply to all water entering the storm drainage system generated on any developed and undeveloped lands lying within the City of Carterville including any amendments or revisions thereto.

#### **SECTION 5. RESPONSIBILITY FOR ADMINISTRATION.**

The Utility Supervisor of the City shall administer, implement, and enforce the provisions of this Article. Any powers granted or duties imposed upon the Utility Supervisor may be delegated in



writing by the Utility Supervisor to persons or entities acting in the beneficial interest of or in the employ of the City.

**SECTION 6. SEVERABILITY.**

The provisions of this Article are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this Article or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this Article.

**SECTION 7. REGULATORY CONSISTENCY.**

This Article shall be construed to assure consistency with the requirements of the Clean Water Act and the Missouri Clean Water Act and acts amendatory thereof or supplementary thereto, or any applicable implementing regulations.

**SECTION 8. ULTIMATE RESPONSIBILITY OF DISCHARGER.**

The standards set forth herein and promulgated pursuant to this Article are minimum standards; therefore this Article does not intend nor imply that compliance by any person will ensure that there will be no contamination, pollution, nor unauthorized discharge of pollutants into waters of the U.S. caused by said person. This Article shall not create liability on the part of the City of Carterville, or any agent or employee thereof for any damages that result from any discharger's reliance on this Article or any administrative decision lawfully made thereunder.

Division II.

Discharge Prohibitions.

**SECTION 9. PROHIBITION OF ILLEGAL DISCHARGES.**

No person shall discharge or cause to be discharged into the municipal storm drainage system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.

The commencement, conduct or continuance of any illegal discharge to the storm drainage system is prohibited except as described as follows:

- (a) Discharges from the following activities will not be considered a source of pollutants to the storm drainage system and to waters of the U.S. when properly managed to ensure that no potential pollutants are present, and therefore they shall not be considered illegal discharges unless determined to cause a violation of the provisions Clean Water Act, or this ordinance: potable water line flushing; uncontaminated pumped groundwater and other discharges from potable water sources; landscape irrigation and lawn watering; diverted stream flows; rising groundwater; groundwater infiltration to the storm drainage system; uncontaminated foundation and footing drains; uncontaminated water from crawl space pumps; air conditioning condensation; uncontaminated roof drains; springs; individual residential and mobile car washing; flows from riparian habitats and wetlands; dechlorinated swimming pool discharges; street wash waters; and flows from fire fighting.
- (b) The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered by the State of Missouri under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted by the City of Carterville for any discharge to the storm drainage system.
- (c) The City of Carterville may exempt in writing other non-storm water discharges which are not a source of pollutants to the storm drainage system nor waters of the U.S.



#### **SECTION 10. PROHIBITION OF ILLICIT CONNECTIONS.**

(a) The construction, use, maintenance or continued existence of illicit connections to the storm drainage system is prohibited.

(b) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

#### **SECTION 11. WASTE DISPOSAL PROHIBITIONS.**

No person shall throw, deposit, leave, maintain, keep, or permit to be thrown, deposited, left, or maintained, in or upon any public or private property, driveway, parking area, street, alley, sidewalk, component of the storm drainage system, or water of the U.S., any refuse, rubbish, garbage, litter, or other discarded or abandoned objects, articles, and accumulations, so that the same may cause or contribute to pollution. Wastes deposited in streets in proper waste receptacles for the purposes of collection are exempted from this prohibition.

#### **SECTION 12. DISCHARGES IN VIOLATION OF INDUSTRIAL OR CONSTRUCTION ACTIVITY NPDES STORM WATER DISCHARGE PERMIT.**

Any person subject to an industrial or construction activity NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Utility Supervisor prior to or as a condition of a subdivision map, site plan, building permit, or development or improvement plan; upon inspection of the facility; during any enforcement proceeding or action; or for any other reasonable cause.

Division III.

Regulations and Requirements.

#### **SECTION 13. REQUIREMENT TO PREVENT, CONTROL, AND REDUCE STORMWATER POLLUTANTS.**

(a) General Discharge. Dischargers shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the storm drainage system. Further, any person responsible for a property or premises, which is, or may be, the source of an illicit or high-risk discharge or has an illicit connection, may be required to implement, at said person's expense, Best Management Practices to prevent the further discharge of pollutants to the storm drainage system. For those facilities covered by an NPDES permit, compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of stormwater associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section.

(b) Contractors for City Services. The City will develop a *Stormwater Quality Plan* listing minimum Best Management Practices for all contractors for City services. With each contract for City services, the contractor will sign a statement of compliance saying they will implement all applicable BMPs in the *Stormwater Quality Plan* for any of the contractor's operations, premises, or facilities within the City Limits. Contractors for City services are also subject to Section 13(a).

#### **SECTION 14. REQUIREMENT TO ELIMINATE ILLEGAL DISCHARGES.**

Notwithstanding the requirements of Division IV, Section 20 herein, the Utility Supervisor may require by written notice that a person responsible for an illegal discharge immediately, or by a specified date, discontinue the discharge and, if necessary, take measures to eliminate the source of the discharge to prevent the occurrence of future illegal discharges.

#### **SECTION 15. REQUIREMENT TO ELIMINATE OR SECURE APPROVAL FOR**

### **ILLCIT CONNECTIONS.**

(a) The Utility Supervisor may require by written notice that a person responsible for an illicit connection to the storm drainage system comply with the requirements of this Article to eliminate or secure approval for the connection by a specified date, regardless of whether or not the connection or discharges to it had been established or approved prior to the effective date of this Article.

(b) If, subsequent to eliminating a connection found to be in violation of this Article, the responsible person can demonstrate that an illegal discharge will no longer occur, said person may request City approval to reconnect. The reconnection or reinstallation of the connection shall be at the responsible person's expense.

### **SECTION 16. WATERCOURSE PROTECTION.**

Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property reasonably free of trash, debris, excessive vegetation, and other obstacles originating from said property that would pollute, contaminate, or significantly retard the flow of water through the watercourse. If the City determines the trash, debris, excessive vegetation, and other obstacles are not being effectively removed, the City can take action to remediate. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse. The owner or lessee shall not remove healthy bank vegetation beyond that actually necessary for maintenance, nor remove said vegetation in such a manner as to increase the vulnerability of the watercourse to erosion. The property owner shall be responsible for maintaining and stabilizing that portion of the watercourse that is within their property lines in order to protect against erosion and degradation of the watercourse originating or contributed from their property.

### **SECTION 17. REQUIREMENT TO REMEDIATE.**

Whenever the Utility Supervisor finds that a discharge of pollutants is taking place or has occurred which will result in or has resulted in pollution of storm water, the storm drainage system, or water of the U.S., the Utility Supervisor may require by written notice to the owner of the property and/or the responsible person that the pollution be remediated and the affected property restored within a specified time pursuant to the provisions of Sections 22 through 25 below.

### **SECTION 18. REQUIREMENT TO MONITOR AND ANALYZE.**

The Utility Supervisor may require by written notice of requirement that any person engaged in any activity and/or owning or operating any facility which may cause or contribute to storm water pollution, illegal discharges, and/or non-storm water discharges to the storm drainage system or waters of the U.S., to undertake at said person's expense such monitoring and analyses and furnish such reports to the City of Carterville as deemed necessary to determine compliance with this Article.

### **SECTION 19. NOTIFICATION OF SPILLS.**

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drainage system, or water of the U.S. from said facility, said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of a hazardous material said person shall immediately notify emergency response officials of the occurrence via

emergency dispatch services (911). In the event of a release of non-hazardous materials, said person shall notify the City in person or by phone or facsimile no later than 5:00 p.m. of the next business day. Notifications in person or by phone shall be confirmed by written notice addressed and mailed to the City within three business days of the phone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three (3) years.

Division IV.

Inspection and Monitoring.

#### **SECTION 20. AUTHORITY TO INSPECT.**

Whenever necessary to make an inspection to enforce any provision of this Article, or whenever the Utility Supervisor has cause to believe that there exists, or potentially exists, in or upon any premises any condition which constitutes a violation of this Article, the Utility Supervisor may enter such premises at all reasonable times to inspect the same and to inspect and copy records related to storm water compliance. In the event the owner or occupant refuses entry after a request to enter and inspect has been made, the City is hereby empowered to seek assistance from any court of competent jurisdiction in obtaining such entry.

#### **SECTION 21. AUTHORITY TO SAMPLE, ESTABLISH SAMPLING DEVICES, AND TEST.**

During any inspection as provided herein, the Utility Supervisor may take any samples and perform any testing deemed necessary to aid in the pursuit of the inquiry or to record site activities.

Division V.

Enforcement.

#### **SECTION 22. NOTICE OF VIOLATION.**

Whenever the Utility Supervisor finds that a person has violated a prohibition or failed to meet a requirement of this Article, the Director may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:

- (a) The performance of monitoring, analyses, and reporting;
- (b) The elimination of illicit connections or discharges;
- (c) That violating discharges, practices, or operations shall cease and desist;
- (d) The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property; and
- (e) Payment of a fine to cover administrative and remediation costs; and
- (f) The implementation of source control or treatment BMPs.

If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by the City or a contractor designated by the Utility Supervisor and the expense thereof shall be charged to the violator pursuant to Section 24 below.

#### **SECTION 23. APPEAL.**

Notwithstanding the provisions of Section 26 below, any person receiving a Notice of Violation under Section 22 above may appeal the determination of the Utility Supervisor to the City Council. The notice of appeal must be received by the City Council within 10 days from the date of the Notice of Violation. Hearing on the appeal before the City Council or their designee shall take place within 30 days from the date of City's receipt of the notice of appeal. The decision of

the City Council or designee shall be final.

**SECTION 24. ABATEMENT BY CITY.**

If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or, in the event of an appeal under Section 23, within 10 days of the decision of the City Council upholding the decision of the Utility Supervisor, then the City or a contractor designated by the Utility Supervisor shall enter upon the subject private property and is authorized to take any and all measures necessary to abate the violation and/or restore the property. It shall be unlawful for any person, owner, agent or person in possession of any premises to refuse to allow the City or designated contractor to enter upon the premises for the purposes set forth above.

**SECTION 25. CHARGING COST OF ABATEMENT/LIENS.**

Within 30 days after abatement of the nuisance by City, the Utility Supervisor shall notify the owner of the property of the cost of abatement, including administrative costs. The property owner may file a written protest objecting to the amount of the assessment with the City Clerk within 15 days. The City Clerk shall set the matter for public hearing by the City Council. The decision of the City Council shall be set forth by resolution and shall be final.

If the amount due is not paid within 10 days of the decision of the City Council or the expiration of the time in which to file an appeal under this Section, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment. A copy of the resolution shall be turned over to the County Auditor so that the auditor may enter the amounts of the assessment against the parcel as it appears on the current assessment roll, and the tax collector shall include the amount of the assessment on the bill for taxes levied against the parcel of land.

**SECTION 26. URGENCY ABATEMENT.**

The Utility Supervisor is authorized to require immediate abatement of any violation of this Article that constitutes an immediate threat to the health, safety or well-being of the public. If any such violation is not abated immediately as directed by the Utility Supervisor, the City of Carterville is authorized to enter onto private property and to take any and all measures required to remediate the violation. Any expense related to such remediation undertaken by the City of Carterville shall be fully reimbursed by the property owner and/or responsible party. Any relief obtained under this section shall not prevent City from seeking other and further relief authorized under this Article.

**SECTION 27. VIOLATIONS.**

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this Article. A violation of or failure to comply with any of the requirements of this Article shall constitute a misdemeanor and shall be punished as set forth in Council Bill No. 2186.

**SECTION 28. COMPENSATORY ACTION.**

In lieu of enforcement proceedings, penalties, and remedies authorized by this Article, the Utility Supervisor may impose upon a violator alternative compensatory actions, such as storm drain stenciling, attendance at compliance workshops, creek cleanup, etc.

**SECTION 29. VIOLATIONS DEEMED A PUBLIC NUISANCE.**

In addition to the enforcement processes and penalties herein before provided, any condition caused or permitted to exist in violation of any of the provisions of this Article is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored by the City at the violator's expense, and/or a civil action to abate, enjoin, or

otherwise compel the cessation of such nuisance may be taken by the City.

**SECTION 30. ACTS POTENTIALLY RESULTING IN A VIOLATION OF THE FEDERAL CLEAN WATER ACT AND/OR MISSOURI CLEAN WATER LAW.**

Any person who violates any provision of this Article or any provision of any requirement issued pursuant to this chapter, may also be in violation of the Clean Water Act and/or the Missouri Clean Water Law and may be subject to the sanctions of those acts including civil and criminal penalties. Any enforcement action authorized under this Article shall also include written notice to the violator of such potential liability.

**SECTION 31. REPEAL OF CONFLICTING ORDINANCES.**

All ordinances and parts of ordinances in conflict herewith are hereby repealed.

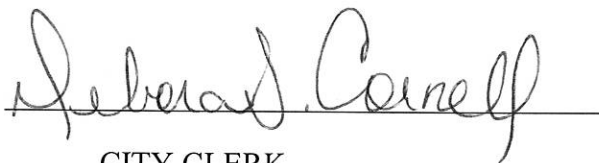
**SECTION 32. ADOPTION OF ORDINANCE.**

This ordinance shall be in full force and effect 30 days after its final passage and adoption.

PASSED AND ADOPTED BY THE COUNCIL OF THE CITY OF CARTERVILLE this 13th day of April, 2010, by the following vote: 6 yes, one no(David Comstock) one absent (Diane Vann)



MAYOR



CITY CLERK



## Illicit Discharge Hotline Incident Tracking Sheet

<b>Incident ID:</b>				
<b>Responder Information</b>				
Call taken by:			Call date:	
Call time:			Precipitation (inches) in past 24-48 hrs:	
<b>Reporter Information</b>				
Incident time:			Incident date:	
Caller contact information ( <i>optional</i> ):				
<b>Incident Location</b> ( <i>complete one or more below</i> )				
Latitude and longitude:				
Stream address or outfall #:				
Closest street address:				
Nearby landmark:				
<b>Primary Location Description</b>		<b>Secondary Location Description:</b>		
<input type="checkbox"/> Stream corridor ( <i>In or adjacent to stream</i> )		<input type="checkbox"/> Outfall	<input type="checkbox"/> In-stream flow	<input type="checkbox"/> Along banks
<input type="checkbox"/> Upland area ( <i>Land not adjacent to stream</i> )		<input type="checkbox"/> Near storm drain	<input type="checkbox"/> Near other water source (storm water pond, wetland, etc.):	
Narrative description of location:				
<b>Upland Problem Indicator Description</b>				
<input type="checkbox"/> Dumping		<input type="checkbox"/> Oil/solvents/chemicals	<input type="checkbox"/> Sewage	
<input type="checkbox"/> Wash water, suds, etc.		<input type="checkbox"/> Other: _____		
<b>Stream Corridor Problem Indicator Description</b>				
Odor	<input type="checkbox"/> None	<input type="checkbox"/> Sewage	<input type="checkbox"/> Rancid/Sour	<input type="checkbox"/> Petroleum (gas)
	<input type="checkbox"/> Sulfide (rotten eggs); natural gas	<input type="checkbox"/> Other: Describe in "Narrative" section		
Appearance	<input type="checkbox"/> "Normal"	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Cloudy	<input type="checkbox"/> Suds
	<input type="checkbox"/> Other: Describe in "Narrative" section			
Floatables	<input type="checkbox"/> None:	<input type="checkbox"/> Sewage (toilet paper, etc)	<input type="checkbox"/> Algae	<input type="checkbox"/> Dead fish
	<input type="checkbox"/> Other: Describe in "Narrative" section			
Narrative description of problem indicators:				
Suspected Violator (name, personal or vehicle description, license plate #, etc.):				

<b>Investigation Notes</b>	
Initial investigation date:	Investigators:
<input type="checkbox"/> No investigation made	Reason:
<input type="checkbox"/> Referred to different department/agency:	Department/Agency:
<input type="checkbox"/> Investigated: No action necessary	
<input type="checkbox"/> Investigated: Requires action	Description of actions:
Hours between call and investigation:	Hours to close incident:
Date case closed:	
Notes:	

# Illicit Discharge Inspection Field Sheet

## Section 1: Background Data

Outfall ID:	
Today's date:	Time:
Investigators:	Form completed by:
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:
Camera:	Photo #s:
Notes (e.g., origin of outfall, if known):	

## Section 2: Outfall Description

LOCATION	MATERIAL	CROSS-SECTION (SHAPE)	DIMENSIONS (IN.)	SUBMERGED
<input type="checkbox"/> Closed Pipe	<input type="checkbox"/> Concrete <input type="checkbox"/> Corrugated Metal <input type="checkbox"/> Plastic <input type="checkbox"/> Other: _____	<input type="checkbox"/> Circular <input type="checkbox"/> Elliptical <input type="checkbox"/> Box <input type="checkbox"/> Other: _____	<input type="checkbox"/> Single <input type="checkbox"/> Double <input type="checkbox"/> Triple <input type="checkbox"/> Other: _____	Diameter/Dimensions: _____  In Water: <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Fully  With Sediment: <input type="checkbox"/> No <input type="checkbox"/> Partially <input type="checkbox"/> Fully
<input type="checkbox"/> Open channel	<input type="checkbox"/> Concrete <input type="checkbox"/> Earthen <input type="checkbox"/> Rip-Rap <input type="checkbox"/> Other: _____	<input type="checkbox"/> Trapezoid <input type="checkbox"/> Parabolic <input type="checkbox"/> Other: _____	Depth: _____ Top Width: _____ Bottom Width: _____	
<b>Flow Present?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <i>If No, Skip to Section 5</i>			
<b>Flow Description (If present)</b>	<input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial			

## Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER	RESULT	UNIT	EQUIPMENT	
<input type="checkbox"/> Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	Stop watch
<input type="checkbox"/> Flow #2	Flow depth		In	Tape measure
	Flow width	_____ ' (Top) _____" (Bottom)	Ft	Tape measure
	Measured length	_____ ' _____"	Ft	Tape measure
	Time of travel		S	Stop watch
Temperature		°F	Thermometer	
pH		pH Units	Test strip/Probe	
Ammonia		mg/L	Test strip	



# Illicit Discharge Inspection Field Sheet

### Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow?  Yes  No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	<input type="checkbox"/>	<input type="checkbox"/> Sewage <input type="checkbox"/> Rancid/sour <input type="checkbox"/> Petroleum/gas <input type="checkbox"/> Sulfide <input type="checkbox"/> Other:	<input type="checkbox"/> 1 – Faint	<input type="checkbox"/> 2 – Easily detected	<input type="checkbox"/> 3 – Noticeable from a distance
Color	<input type="checkbox"/>	<input type="checkbox"/> Clear <input type="checkbox"/> Brown <input type="checkbox"/> Gray <input type="checkbox"/> Yellow <input type="checkbox"/> Green <input type="checkbox"/> Orange <input type="checkbox"/> Red <input type="checkbox"/> Other:	<input type="checkbox"/> 1 – Faint colors in sample bottle	<input type="checkbox"/> 2 – Clearly visible in sample bottle	<input type="checkbox"/> 3 – Clearly visible in outfall flow
Turbidity	<input type="checkbox"/>	See severity	<input type="checkbox"/> 1 – Slight cloudiness	<input type="checkbox"/> 2 – Cloudy	<input type="checkbox"/> 3 – Opaque
Floatables - Does Not include trash!!	<input type="checkbox"/>	<input type="checkbox"/> Sewage (Toilet Paper, etc.) <input type="checkbox"/> Suds <input type="checkbox"/> Petroleum (oil sheen) <input type="checkbox"/> Other:	<input type="checkbox"/> 1 – Few/slight; origin not obvious	<input type="checkbox"/> 2 – Some; indications of origin (e.g., possible suds or oil sheen)	<input type="checkbox"/> 3 – Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

### Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present?  Yes  No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	<input type="checkbox"/>	<input type="checkbox"/> Spalling, Cracking or Chipping <input type="checkbox"/> Peeling    Paint <input type="checkbox"/> Corrosion	
Deposits/Stains	<input type="checkbox"/>	<input type="checkbox"/> Oily <input type="checkbox"/> Flow Line <input type="checkbox"/> Paint <input type="checkbox"/> Other:	
Abnormal Vegetation	<input type="checkbox"/>	<input type="checkbox"/> Excessive <input type="checkbox"/> Inhibited	
Poor pool quality	<input type="checkbox"/>	<input type="checkbox"/> Odors <input type="checkbox"/> Colors <input type="checkbox"/> Floatables <input type="checkbox"/> Oil Sheen <input type="checkbox"/> Suds <input type="checkbox"/> Excessive Algae <input type="checkbox"/> Other:	
Pipe benthic growth	<input type="checkbox"/>	<input type="checkbox"/> Brown <input type="checkbox"/> Orange <input type="checkbox"/> Green <input type="checkbox"/> Other:	

### Section 6: Overall Outfall Characterization

<input type="checkbox"/> Unlikely <input type="checkbox"/> Potential (presence of two or more indicators) <input type="checkbox"/> Suspect (one or more indicators with a severity of 3) <input type="checkbox"/> Obvious
---

### Section 7: Data Collection

1. Sample for the lab?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. If yes, collected from:	<input type="checkbox"/> Flow	<input type="checkbox"/> Pool

### Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?



**Standard Operating Procedures  
for  
Field Response  
to Spills &  
Reports of Illicit Discharge**

December 2023

# **Standard Operating Procedures For Field Response to Spills & Reports of Illicit Discharge**

## **In-Office Activities:**

### 1) Gather pertinent information:

- Responsible Party - name, title, Phone #, location.
- Complainant - name, title, Phone #, location.
- Water body, incident location, suspected source.
- Details of what happened & when.
- Contact info for Environmental Response
  - Carterville City Hall – 417-673-1341
  - Police Department – 417-673-2616 (non-emergency dispatch #)
  - MDNR Environmental Emergency Response 573-638-2436 (Must report if there is contamination of Waters of the State, a fish kill, or a fuel spill of more than 50 gallons.)

### 2) Gather Equipment:

- Spill response kit (sampling equipment-bottles, equipment, gloves, chain of custody, SOP etc...)
- Phone,
- Camera,
- GPS,
- Boots/ waders / field gear,
- Copy of name/numbers of people that you may need to contact.

## **On-Site Activities:**

NOTE: Do not touch the discharge unless you know it is safe.

- 1) Determine leading edge of discharge in order to evaluate extent of damage.
- 2) Locate source and work to get discharge stopped (if applicable). Use “Tracing the Source” procedures found on page 17 of the Field Investigation Guide for Illicit Discharge Detection & Elimination.
- 3) Require mitigation activities as needed such as dams, diversions, booms, etc. When possible (considering terrain and amount of discharge), require vacuum trucks, or other physical removal of the discharge.
- 4) Collect samples if possible. Sample locations:
  - Area where discharge entered stream,
  - Upstream of discharge,
  - Any storm system where contaminants were discharged,
  - Area where discharge is at time of investigation,
  - Area downstream of discharge.

- 5) Take notes of other life in stream, such as macroinvertebrates, algae, and fish. Note their size and behavior.
- 6) Isolate source with samples, photos, and other evidence. Eliminate other possible sources through sampling and photos.
- 7) If rainfall is a factor, determine duration, amount, and intensity.
- 8) Interview neighbors/employees as necessary to determine any other pertinent information on incident.
- 9) Request that the responsible party post public notice signs if there is possible impact for human health and is in a public access area.
- 10) Collect Field Notes:
  - Arrival time,
  - Sample collection times,
  - Departure time,
  - Contacts,
  - Others involved,
  - Document any actions by responsible party, and
  - Time spent on investigation.

Additional resources:

>Water, wastewater, and sewer spills

- >Carthage utility 417-237-7300 (vactruck)
- >Webb City PW (417) 673-6297 (vactruck)

>Grease or sewer clean-up

- >C&L grease (417) 717-0587

>Gas and petroleum spills

- >Cartersville Fire Dept. (417-673-3070)
- >Jasper county dispatch/Jasper County Emergency Management (417-673-5303)



# **Standard Operating Procedures for Illicit Discharge Enforcement**

December 2023

# Summary of Enforcement Procedures

Upon discovery of an illicit discharge and determination of its source, the City and/or designee shall follow the procedures below. City Code references are from Chapter 250.

NOTE: If the violation constitutes an immediate danger to public health or public safety, the City and/or designee is authorized to enter upon the subject private property, without giving prior notice, to take any and all measures necessary to abate the violation and/or restore the property. (Skip to Item 8 below.)

## 1) NOTICE OF VIOLATION: (City Code, Section 250.140)

Upon discovery of an illicit discharge and determination of its source, the City and/or designee may order compliance by written notice of violation to the responsible person. The notice of violation shall contain:

- a. The name and address of the alleged violator;
- b. The address when available or a description of the building, structure or land upon which the violation is occurring, or has occurred;
- c. A statement specifying the nature of the violation;
- d. A description of the remedial measures necessary to restore compliance with Chapter 250 of City Code and a time schedule for the completion of such remedial action;
- e. A statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;
- f. A statement that the determination of violation may be appealed to the City by filing a written notice of appeal within ten (15) days of service of notice of violation;
- g. A statement specifying that, should the violator fail to restore compliance within the established time schedule, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator. Such notice may require without limitation:
  - i. The performance of monitoring, analyses, and reporting
  - ii. The elimination of illicit connections or discharges;
  - iii. That violating discharges, practices, or operations shall cease and desist;
  - iv. The abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property;
  - v. Payment of a fine to cover administrative and remediation costs; and
  - vi. The implementation of source control or treatment BMPs.

*Compensatory Action:* In lieu of enforcement proceedings, penalties, and remedies authorized by Chapter 250 of City Code, the City and/or designee may impose upon violator alternative compensatory actions, such as storm drain stenciling, attendance at compliance workshops, creek cleanup, etc. (City Code, Section 250.190)

## 2) PERMITTEE'S RESPONSE TO WRITTEN NOTICE: (City Code, Section 250.140)

- a. The permittee should investigate immediately and take any action required to cease the illicit discharge. Such actions are to be taken within seventy-two (72) hours, or within a reasonable time after receipt of notice. All actions taken are to be reported to the City within the designated time period.
- b. Time may be extended if weather conditions or other factors beyond the control of the permittee prevent immediate remedial action.

3) NOTICE OF COMPLIANCE:

Upon satisfactory cessation of discharge and any required remedial work the City shall issue a Notice of Compliance.

4) FAILURE TO COMPLY WITH NOTICE OF VIOLATION: (City Code, Section 250.160, 170, & 210)

If the violation has not been corrected pursuant to the requirements set forth in the notice of violation:

- a. *Remedial Action by City:* The City and/or designee shall enter upon the subject private property and are authorized to take any and all measures necessary to abate the violation and/or restore the property.
- b. *Denial of Entrance to Property:* It shall be unlawful for any person, owner, agent or person in possession of any premises to refuse to allow the government agency or designated contractor to enter upon the premises for the purposes set forth above.
- c. *Cost of Abatement:*
  - i. Within thirty (30) days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs.
  - ii. The property owner may file a written protest objecting to the amount of the assessment within ten (10) days. If the amount due is not paid within a timely manner as determined by the decision of the municipal authority or by the expiration of the time in which to file an appeal, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment.
  - iii. The City and/or designee may recover all attorneys' fees court costs and other expenses associated with enforcement of Chapter 250 of City Code , including sampling and monitoring expenses.

5) APPEALS: (City Code, Section 250.150)

Any person receiving a notice of violation may appeal the determination of the City and/or designee.

- a. The notice of appeal must be received within ten (10) days from the date of the notice of violation.
- b. Hearing on the appeal before the appropriate authority, or their designee, shall take place within fifteen (15) days from the date of receipt of the notice of appeal.
- c. The decision of the municipal authority, or their designee, shall be final.

6) ENFORCEMENT MEASURES AFTER APPEAL: (City Code, Section 250.160)

In the event of an appeal, if the violation has not been corrected within thirty (30) days of the decision of the municipal authority upholding the decision of the City and/or designee, then Item 4 above will apply.

7) CRIMINAL PROSECUTION: (City Code, Section 250.210 & 250.200)

- a. *Criminal Prosecution:* Any person that has violated, or continues to violate, Chapter 250 of City Code shall be liable to criminal prosecution to the fullest extent of the law. The City and/or designee may recover all attorneys' fees court costs and other expenses associated with enforcement of Chapter 250 of City Code, including sampling and monitoring expenses.
- b. *Violations Deemed a Public Nuisance:* In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of Chapter 250 of City Code is a threat to public health, safety, and welfare, and is declared and

deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

**FOR EMERGENCY SITUATIONS AND/OR CONTINUING VIOLATIONS:**

- 8) SUSPENSION OF MS4 ACCESS: (City Code, Section 250.080)
- a. *Suspension due to Illicit Discharges in Emergency Situations.* The City and/or designee may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, or to the health or welfare of persons, or to the MS4 or waters of the United States. If the violator fails to comply with a suspension order issued in an emergency, the City and/or designee may take such steps as deemed necessary to prevent or minimize damage to the MS4 or waters of the United States, or to minimize danger to persons.
  - b. *Suspension due to the Detection of Illicit Discharge.* Any person discharging to the MS4 in violation of Chapter 250 of City Code may have their MS4 access terminated if such termination would abate or reduce an illicit discharge. The City and/or designee will notify a violator of the proposed termination of its MS4 access. The violator may petition the City for a reconsideration and hearing. A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to Chapter 250, without the prior approval of the City and/or designee.



APPENDIX **MCM 4**

CONSTRUCTION SITE  
STORMWATER RUNOFF CONTROL

CHECKLISTS AND  
SUPPORTING DOCUMENTS

AN ORDINANCE APPROVING AMENDMENTS TO THE CITY CODE.  
BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF CARTERVILLE,  
MISSOURI, AS FOLLOWS:

SECTION 1. THAT THE CITY ADOPT THE FOLLOWING STORMWATER  
MANAGEMENT CODES TO BE INCORPORATED INTO CHAPTER 250 OF THE CITY  
CODE.

#### INTRODUCTION AND PURPOSE

During the construction process, soil is highly vulnerable to erosion by wind and water. Eroded soil endangers water resources by reducing water quality and causing the siltation of aquatic habitat for fish and other desirable species. Eroded soil also necessitates repair of sewers and ditches and the dredging of waterways. In addition, clearing and grading during construction cause the loss of native vegetation necessary for terrestrial and aquatic habitat.

As a result, the purpose of this local regulation is to safeguard persons, protect property, and prevent damage to the environment in Carterville. This ordinance will also promote the public welfare by guiding, regulating, and controlling the design, construction, use, and maintenance of any development or other activity that disturbs or breaks the topsoil or results in the movement of earth on land in Carterville.

#### DEFINITIONS

Unless specifically defined below, words or phrases use in this Article shall be interpreted so as to give them the meaning they have in common usage and to give this Article it's most reasonable application.

*Certified Contractor:* A person who has received training and is licensed by the City of Carterville to inspect and maintain erosion and sediment control practices.

*Clearing:* Any activity that removes the vegetative surface cover.

*Drainage Way:* Any channel that conveys surface runoff throughout the site.

*Erosion Control:* A measure that prevents erosion.

*Erosion and Sediment Control Plan:* A set of plans prepared by or under the direction of a licensed professional engineer. Indicating the specific measures and sequencing to be used to control sediment and erosion on a development site during and after construction.

*Grading:* Excavation of fill of material, including the resulting conditions thereof.

*Grading Permit:* A permit issued by the City of Carterville for the construction or alteration of ground. Improvements and structures for the control of erosion, runoff, and grading.

*Perimeter Control:* A barrier that prevents sediment from leaving a site by filtering sediment-laden runoff or diverting it to a sediment trap or basin.

*Phasing:* clearing a parcel of land in distinct phases, with the stabilization of each phase completed before the clearing of the next.

*Sediment Control:* Measures that prevent eroded sediment from leaving the site.

*Site:* A parcel of land or a contiguous combination thereof, where grading work is performed as a single unified operation.

*Stabilization:* The use of practices that prevent exposed soil from eroding.

*Start of Construction:* The first land-disturbing activity associated with a development, including land preparation such as clearing, grading, and filling; installation of streets and walkways; excavation for basements, footings, piers, or foundations; erection of temporary forms; and installation of accessory buildings such as garages.

*Watercourse:* Any body of water, including, but not limited to lakes, ponds, rivers, streams, and bodies of water delineated by the City of Carterville.

*Waterway:* A channel that directs surface runoff to a watercourse or to the public storm drain.

## PERMITS

A. A grading permit shall be required for any clearing, grading, filling, or construction activities that result in the following:

1. Land disturbance of greater than or equal to one (1) acre, or
2. Land disturbance of less than one (1) acre, if that activity is part of a larger common plan of development or sale that would disturb a total of one acre or more.

B. No grading permit is required for the following activities:

1. Any emergency activity that is immediately necessary for the protection of life, property, or natural resources.
2. Existing nursery and agricultural operations conducted as a permitted main or accessory use.

C. Application requirements are listed in the City of Carterville Stormwater Management Criteria.

## REVIEW AND APPROVAL

A. The City of Carterville will review each application for a grading permit to determine its conformance with the provisions of this regulation. Within 45 days after receiving an application the City of Carterville shall, in writing:

1. Approve the permit application;
2. Approve the permit application subject to such reasonable conditions as may be necessary to secure substantially the objectives of this regulation, and issue the permit subject to these conditions; or,
3. Disapprove the permit application, indicating the reason(s) and procedure for submitting a revised application and/or submission.

B. Failure of the City of Carterville to act on an original or revised application within 45 days of receipt shall authorize the applicant to proceed in accordance with the plans as filed unless such time is extended by agreement between the applicant and the City of Carterville. Pending preparation and approval of a revised plan, development activities shall be allowed to proceed in accordance with conditions established by the City of Carterville.

## EROSION AND SEDIMENT CONTROL PLAN

A. The Erosion and Sediment Control Plan shall comply with the Sediment and Erosion Control Plan section of the City of Carterville Stormwater Management Criteria.

B. Modifications to the plan shall be processed and approved or disapproved by the City of Carterville by written authorization to the permittee, and shall include;

1. Major amendments of the erosion and sediment control plan submitted to the City of Carterville.
2. Field modifications of a minor nature.

## DESIGN REQUIREMENTS

A. Grading, erosion control practices, sediment control practices, and waterway crossing shall meet the design criteria set forth in the most recent version of the City of Carterville Stormwater Management Criteria, and shall be adequate to prevent transportation of sediment from the site to the satisfaction of the City of Carterville.

## INSPECTION

A. The City of Carterville or designated agent shall make inspections as hereinafter required and either shall approve that portion of the work completed or shall notify the permittee wherein the work fails to comply with the Erosion and Sediment Control Plan as approved. Plans for grading, stripping, excavating and filling work bearing the stamp of approval of the City of Carterville shall be maintained at the site during the progress of the work. To obtain inspections, the permittee shall notify the City of Carterville at least 24 hours before the following:

1. Start of construction.
2. Installation of sediment and erosion measures.
3. Completion of site clearing.
4. Completion of rough grading.
5. Completion of final grading.
6. Close of the construction season.
7. Completion of final landscaping.

B. The permittee of his/her agent shall make regular inspections of all control measures in accordance with the inspection schedule outlined on the approved Erosion and Sediment Control Plan(s). The purpose of such inspections will be to determine the overall effectiveness of the control plan and the need for additional control measures. All inspections shall be documented in written form and submitted to the City of Carterville at the time interval specified in the approved permit.

C. The City of Carterville or its designated agent shall enter the property of the applicant as deemed necessary to make regular inspections to ensure the validity of the reports under paragraph B above.

## ENFORCEMENT

A. Stop-Work Order; Revocation of Permit.

In the event that any person holding a grading permit pursuant to this Article violates the terms of the permit or implement site development in such a manner as to materially adversely affect the health, welfare, or safety of persons residing or working in the neighborhood or development site so as to be materially detrimental to the public welfare or injurious to property or improvements in the neighborhood, the City of Carterville may suspend or revoke the grading permit.

B. Violations and Penalties.

No person shall construct, enlarge, alter, repair, or maintain any grading, excavation, or fill, or cause the same to be done, contrary to or in violation of any terms of this Article. Any person violating any of the provisions of this Article shall be deemed guilty of a misdemeanor and each day during which any violation of any of the provisions of this Article is committed, continued, or permitted, shall constitute a separate offense. Upon conviction of any such violation, such person, partnership, or corporation shall be punished by a fine of not more than \$500.00 for each offense. In addition to any other penalty authorized by this section, any person, partnership, or corporation convicted of violating any of the provisions of this Article shall be required to bear the expense of such restoration.

**Section 2. That the Mayor is hereby authorized and directed to execute said Ordinance by and on behalf of the City of Carterville.**

Passed by the City Council of the City of Carterville, Missouri this *12<sup>th</sup>* day of *March*, 2024

Attest:

*Debra S. Cornell*  
City Clerk

City of Carterville  
By: *Alan [Signature]*  
Mayor



# CITY OF CARTERVILLE, MISSOURI

## Pre-Construction Plan Checklist

DATE: \_\_\_\_\_

**A. Name of Project:** \_\_\_\_\_

**B. Location of Project:** \_\_\_\_\_

**C. Name of Owner:** \_\_\_\_\_

**D. Name and Company of Engineer:** \_\_\_\_\_

### E. Checklist

- Applicant information including name, legal address, and telephone number
- Common address and legal description of site
- Signature and seal of registered engineer/surveyor
- Design/owner certification
- Vicinity map
- Project narrative (in the Drainage Report, usually)

#### E.1 Existing and proposed mapping and plans (recommended scale of 1" = 50' or greater detail), which illustrate at a minimum:

- Existing and proposed topography (minimum of 2-foot contours recommended)
- Drainage area map showing watershed and subbasin boundaries, labeled with unique identifiers and areas, for both pre-project and post-project conditions.
- Perennial and intermittent streams.
- Mapping of predominant soils from USDA soil surveys as well as location of any site-specific borehole investigations that may have been performed.
- Boundaries of existing predominant vegetation and proposed limits of clearing
- Location and boundaries of resource protection areas such as wetlands, lakes, ponds, and other setbacks (e.g., stream buffers, drinking water well setbacks, septic setbacks)
- Location of existing and proposed roads, buildings, and other structures
- Minimum finished floor elevations for structures adjacent to drainage features
- Location of existing and proposed utilities (e.g., water, sewer, gas, electric) and easements
- Location of existing and proposed conveyance systems such as grass channels, swales, and storm drains
- Flow paths
- Location of floodplain/floodway limits and relationship of site to upstream and downstream properties and drainages
- Location and dimensions of proposed channel modifications, such as bridge or culvert crossings
- Location, size, maintenance access, and limits of disturbance of proposed structural stormwater management practices

#### E.2 Representative cross-section and profile drawings and details of structural stormwater.

**E.3 Management practices and conveyances (i.e., storm drains, open channels, swales, etc.) which include:**

- Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)
- Design water surface elevations
- Structural details of outlet structures, embankments, spillways, stilling basins, grade control structures, conveyance channels, etc.
- Logs of borehole investigations that may have been performed along with supporting geotechnical report.

**E.4 Hydrologic and hydraulic analysis for all structural components of stormwater system (e.g., storm drains, open channels, swales, management practices, etc.) for applicable design storms including:**

- If detention is required, then calculations must be based on undeveloped conditions (Section 10.2 of the Stormwater Management Criteria Manual). [If detention is *not* required, then the Engineer is to perform a pre-project condition analysis for time of concentrations, runoff rates, volumes, velocities, and water surface elevations showing methodologies used and supporting calculations.]
- Huff's Quartile Rainfall Distributions are to be used for developing the necessary set of hydrographs for consideration (10.4.B).
- Summary table of subbasins including area, curve numbers/runoff coefficient, percent impervious, times of concentration.
- Post-project condition analysis for time of concentrations, peak runoff rates, times to peak, volumes, velocities, water surface elevations, and routing showing the methodologies used and supporting calculations.
- Summary table of results including peak discharges for all durations and annual probabilities analyzed, maximum stages, with controlling events highlighted.
- Final sizing calculations for structural stormwater management practices including, contributing drainage area, storage, and outlet configuration.
- Stage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities (e.g., stormwater ponds and wetlands)
- DRY BASIN: Additional storage volume provided for accumulated sediment below spillway (10.3.B). Either directly calculated and demonstrated to be provided in the design; OR, if 125% of the WQCV is incorporated into the design, that will suffice (Paragraph 13.4.e).
- WET BASIN: Min. of 3.0 feet of depth must be provided (10.3.B).
- Analysis of potential downstream impact/effects of project, where necessary.

**E.5 Erosion and sediment control plan that at a minimum meets the requirements of Section 14 of the Stormwater Management Criteria Manual.**

- Sequence of construction
- Construction entrances
- BMP locations and details
- Identify permanent and temporary BMPs

**E.6 Water Quality (Section 13 of the Stormwater Management Criteria Manual).**

- Does the Grading Plan indicate the designer has minimized the amount of direct runoff into the drainage systems? Are the directly connected impervious areas minimized? (See Figure 33.)



Project: \_\_\_\_\_

Property Address: \_\_\_\_\_

- Is extended detention or other water quality BMP required? (Paragraph 13.3.a requires it if the total impervious area > 10% of the total land area of the development.)
- Is runoff directed to a sand filter, etc. for runoff from areas having high concentrations of pollutants (fueling areas, etc.)? (13.3.b)
- Are calculations shown to determine water quality control volume (WQCV)? (13.4)
- Is the flow from the 2-year (50% AEP) storm detained to pre-project levels? (13.2.c)

**E.7 Maintenance Plan for Permanent BMPs**

The Maintenance Plan shall include the following:

- Name, address, and phone number of responsible parties for maintenance.
- Map of site with all Permanent BMPs labeled, structural (detention, grass swales, etc.) or non-structural (buffer zones for streams/wetlands, tree protection, etc.)
- Description of annual maintenance tasks.
- Description of applicable easements.
- Description of funding source.
- Minimum vegetative cover requirements.
- Access and safety issues.
- Testing and disposal of sediments that will likely be necessary.
- Evidence of acquisition of all applicable permits.
- Evidence of acquisition of all necessary legal agreements (e.g., easements, covenants, land trusts).
- Waiver requests

**F. Signatures and Certifications**

1. As the Owner (Applicant) and Engineer of Record, we understand that the review by the City is only for verification that the proposed improvements generally conform to the Stormwater Management Design Criteria Manual. The City is not approving the design or the suitability of the design for the application. The review does not relieve the applicant from complying with all rules, regulations, ordinances, laws or statutes that are in effect at the time of design or construction.

The applicant shall retain full responsibility for any damages, which may result from any construction activity.

It is understood that approval of the plan submitted with this application shall be valid only for the duration of the initial project approval granted by the City. In no case shall the approval extend beyond three and one half years at which time resubmission and certification will be required. It is further understood that all documents, site plans, design reports etc. submitted to the City shall be made available to the public (upon request) pursuant to The Sunshine Law.

\_\_\_\_\_  
(Owner's Printed Name)

\_\_\_\_\_  
(Owner's Signature)

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Engineer's Printed Name)

\_\_\_\_\_  
(Engineer's Signature)

\_\_\_\_\_  
(Date)

Project:

Property Address:

---

2. One copy of the SWPPP, design plans, all specifications and supporting calculations, forms, and reports are herewith submitted and made a part of this application. I have placed my signature and seal on the design documents submitted signifying that I accept responsibility for the design of the system. Further, I certify to the best of my knowledge and belief that the design is consistent with the requirements of the city's Stormwater Management Criteria.

---

(Engineer's Seal, Signature and Date)

3. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I hereby certify that all land-disturbing construction and associated activity pertaining to this site shall be accomplished pursuant to and in keeping with the terms and conditions of the approved plans. I also certify that a responsible person will be assigned to the project for day-to-day control. I hereby grant authorization to the local implementing agency the right of access to the site at all times for the purpose of on-site inspections during the course of construction and to perform maintenance inspections following the completion of the land-disturbing activity.

---

(Signature of Project Owner/Operator)



# STORMWATER CONSTRUCTION INSPECTION CHECKLIST

City of Carterville

1200 East First Street · Carterville, MO 64855 · (417) 673-1341

This form is to be used for stormwater inspections by City of Carterville inspection staff. A copy of this form is to be left with the development's responsible party, on-site if feasible. Form updated Dec. 2023

**Date of Inspection:** \_\_\_\_\_ **Grading Permit #:** \_\_\_\_\_ **Bldg Permit #:** \_\_\_\_\_

**Project Name/Location:** \_\_\_\_\_ **Contractor/Owner:** \_\_\_\_\_

**Inspection Type:**     Regular     Rain Event (Amt. \_\_\_\_\_)     Complaint     Drive-By     Final

**Inspected by:** \_\_\_\_\_

SWPPP Review		Adequate	Needs Maintenance	Comply By	Comments
1	SWPPP is on site and updated with records attached?	<input type="checkbox"/>	<input type="checkbox"/>		
2	Permit sign/notice is posted at construction site?	<input type="checkbox"/>	<input type="checkbox"/>		
3	Inspections performed every 14 days and after rain events?	<input type="checkbox"/>	<input type="checkbox"/>		

Best Management Practices (BMPs)		Adequate	Needs Maintenance	Comply By	Comments
4	Streets & other property free of sediment & trash?	<input type="checkbox"/>	<input type="checkbox"/>		
5	Construction debris & trash properly covered/disposed?	<input type="checkbox"/>	<input type="checkbox"/>		
6	Perimeter controls properly installed & maintained?	<input type="checkbox"/>	<input type="checkbox"/>		
7	Inlet protection properly installed & maintained?	<input type="checkbox"/>	<input type="checkbox"/>		
8	Washout facilities available, marked, & maintained?	<input type="checkbox"/>	<input type="checkbox"/>		
9	Construction entrance properly constructed/maintained/utilized?	<input type="checkbox"/>	<input type="checkbox"/>		
10	Disturbed areas stabilized after activity has ceased for 14 days?	<input type="checkbox"/>	<input type="checkbox"/>		
11	Discharge points & receiving waters free of sediment?	<input type="checkbox"/>	<input type="checkbox"/>		
12	Other erosion & sediment controls properly installed/constructed/maintained according to SWPPP?	<input type="checkbox"/>	<input type="checkbox"/>		
13	Stockpiles stabilized or contained by a BMP?	<input type="checkbox"/>	<input type="checkbox"/>		
14	Are permanent stormwater controls being implemented?	<input type="checkbox"/>	<input type="checkbox"/>		
15	Temporary BMPs no longer needed are removed?	<input type="checkbox"/>	<input type="checkbox"/>		
16	Fuel storage areas have secondary containment?	<input type="checkbox"/>	<input type="checkbox"/>		
17	Solvents, paints, fertilizers, etc. stored in a manner prohibiting exposure to rain or runoff?	<input type="checkbox"/>	<input type="checkbox"/>		
18	Dewatering operations filtering sediment/pollutants?	<input type="checkbox"/>	<input type="checkbox"/>		
19	Dust control practices utilized?	<input type="checkbox"/>	<input type="checkbox"/>		
20	Are natural resource areas (streams, wetlands, mature trees, stream buffers, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/>	<input type="checkbox"/>		

**Action Taken:**     Verbal Warning     Written Warning     Stop Work Notice

**Additional Comments:**

See photos.

**Additional Comments:**

“I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.”

**Inspector's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_



*City of Cartersville, Missouri*

---

# **STORMWATER MANAGEMENT CRITERIA**



**ALLGEIER, MARTIN and ASSOCIATES, INC.**

*Consulting Engineers and Surveyors*

March 2, 2010

# **Stormwater Management Criteria**

Prepared for:

Carterville, Missouri

Prepared by:

**ALLGEIER, MARTIN and ASSOCIATES, INC.**  
**Hydro Division**

March 2, 2010

**CITY OF CARTERVILLE, MISSOURI  
STORMWATER MANAGEMENT CRITERIA**

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\* \* \* \* \*

## Acknowledgements

Cartersville, Missouri Stormwater Management Criteria was created March, 2010 by Allgeier, Martin and Associates, Inc.

This manual is adapted from the Joplin, Missouri “Stormwater Management Criteria” prepared by Burns and McDonnell, 1998, revised May 2003, and from “Greene County Storm Water Design Standards” prepared April 1999.

## 1.0 GENERAL

**1.1 Introduction:** This document provides uniform procedures for designing and checking the design of storm drainage systems under the rainfall and land characteristics typical of Carterville, Missouri. Specific criteria have been developed and are applicable to the types of drainage systems and facilities ordinarily encountered in local urban and suburban areas. Other special situations may be encountered that require added criteria or more complex technology than included herein. Any design procedure conforming to current accepted engineering practice, including the application of computers, may be used for the design of storm drainage system in lieu of the computation methods presented in these criteria providing equivalent results are obtained.

**1.2 Applicability:** These criteria are applicable to all new storm drainage systems and facilities and to the rehabilitation of existing drainage system facilities.

**1.3 General Requirements:** The design shall be accomplished under the direction of a Registered Professional Engineer. The design shall also be based on land use in the tributary area as zoned, actually developed, or indicated by the City's current comprehensive land use plan, whichever basis produces the greatest runoff.

### 1.4 Definitions/Abbreviations:

**A. Annual Probability (AP):** The probability, likelihood, or chance, of the magnitude of a storm event of a specified duration, being equaled or exceeded in any given year. Usually expressed as a percentage.

**B. Bank Line:** The line of intersection, above the normal depth of flow at design capacity, of the side slope of an open channel and the adjacent ground.

**C. BMP:** Best Management Practice.

**D. CFS:** Cubic feet/foot per second.

**E. City:** The City of Carterville, having jurisdiction and authority to govern.

**F. City Engineer:** The municipal public works engineer or official having jurisdiction and authority to review and approve plans and designs for storm drainage systems.

**G. Developer:** Any person, partnership, association, corporation, public agency, or governmental unit proposing to engage or currently engaged in "development" as defined below excluding the widening, resurfacing, or other improvement to existing streets, alleys, and sidewalks.

**H. DCIA:** Directly Connected Impervious Area.

**I. Diversion:** Discharge or conveyance of stormwater to a watershed other than the watershed of origination.

**J. Development:** Any man-made change to improved or unimproved real estate, including but not limited to buildings, other structures, pavement, filling, grading or storage of equipment or materials.

- K. Easement:** Authorization by a property owner for the use of any designated part of the property by another for a specified purpose.
- L. FEMA:** Federal Emergency Management Agency.
- M. Floodplain:** The normally dry land adjoining rivers, streams, lakes or other bodies of water that is inundated during flood events. In order to provide a standard national procedure for floodplain management, the U.S. Federal Emergency Management Agency (FEMA) has adopted the 1% Annual Probability (AP) flood as the base flood.
- N. Floodway:** The channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment in order for the 1% AP flood to be carried without substantial increase in flood heights. FEMA's easements preclude any improvement to the land occupied by the easement.
- O. Flowage Easement:** Easement acquired for the right to periodically use an open channel and its overbank floodway, or the overflow channel above an enclosed system element, to convey drainage. Flowage easements preclude any improvement to the land occupied by the easement.
- P. Freeboard:** The difference in elevation between the top of a structure, such as a dam or open channel, and the maximum design water surface elevation or high water mark. It is an allowance against overtopping by waves or other transient disturbances.
- Q. Improved Channel:** Any new open channel which has been constructed or existing channel which has been changed by grading or by the construction of lining materials.
- R. MDNR:** Missouri Department of Natural Resources.
- S. Natural Channel:** An existing channel that has not been altered by previous construction.
- T. Owner:** The owner of record of real property.
- U. Registered Professional Engineer:** A licensed engineer who is registered with and authorized by the Missouri Board for Architects, Professional Engineers and Professional Land Surveyors to practice.
- V. Return Period:** Also referred to as return frequency or recurrence interval. A statistical term for the average frequency that a given event may be expected to occur although it does not imply that the event will occur regularly at even intervals. It can also be defined as the reciprocal of the annual probability of an event. For example, a 50-year storm has a probability of  $1/50 = 0.02$  (2% AP) of occurring in any given year.
- W. Site:** A tract, or contiguous tracts, of land owned and/or controlled by a developer or owner. Platted subdivisions, industrial and/or office-commercial parks, and other planned unit developments shall be considered a single site.
- X. Storm Drainage System:** All of the natural and man-made facilities and appurtenances such as ditches, natural channels, swales, pipes, culverts, bridges, open improved channels, street gutters, inlets, and detention facilities which serve to convey surface drainage.

**Y. Storm Water Detention Facility:** Any structure, device, or combination thereof with a controlled discharge rate less than its inflow rate.

1. Controlled Area: That part of the tributary area for which a detention facility is designed to control peak discharge rates.
2. Detention Storage: The volume occupied by water between the levels of the principal and emergency spillway crests during operation of the facility.
3. Dry Detention Facility: Any detention facility designed to permit no permanent impoundment of water.
4. Emergency Spillway: A device or devices used to discharge water under conditions of inflow that exceed the design inflow. The emergency spillway functions primarily to prevent damage to the detention facility that would permit the sudden release of impounded water.
5. Principal Spillway: A device such as an inlet, pipe, weir, etc., used to discharge water during operation of the facility under the conditions of the 1% AP or more frequent event.
6. Private Detention Facility: Any detention facility controlling discharge from a site wholly owned and controlled by one owner or entity and not platted for future subdivision of ownership. Also, all facilities incorporating detention storage of stormwater in or on areas also used for other purposes such as parking lots, building or structure roofs, and open channels. Private detention facilities may be located off-site with approval of the City Engineer contingent upon documentation that drainage easements have been obtained for both the detention basin and the channel connecting the provisions for maintenance of the facilities.
7. Public Detention Facility: Any detention facility controlling discharge from a tributary area owned by more than one owner and/or platted for future subdivision of ownership, except as defined as private detention facility herein.
8. Regional Detention Facility: Any detention facility designed and located to provide detention on major drainage channels and with a tributary area of 100 acres or greater.
9. Sediment Storage: The volume allocated to contain accumulated sediments within the detention facility.
10. Wet Detention Facility: A detention facility that is designed to include permanent storage of water in addition to the temporary storage used to control discharge rates from the facility.

**Z. Tributary Area:** All land draining to the point of consideration, regardless of ownership.

**1.5 Design Probabilities:** All enclosed and improved open channel conveyance system components shall be designed for the 10% AP peak flow or the capacity of the existing upstream improved system, whichever is greater with the following exceptions:

- A. Facilities located within the Federally designated floodway of the 1% AP floodplain shall be designed for the 1% AP peak flow.
- B. Bridges, pipes and culverts crossing arterial streets shall be designed for the 2% AP peak flow, unless subject to the requirements of No. 1, above.
- C. With consent of the City Engineer.

**1.6 System Types and Applications:**

- A. **Enclosed Pipe-Inlet Systems:** Enclosed systems consisting of underground pipes, culverts, curb inlets and similar functional underground structures shall be used to convey stormwater under the following conditions.



1. Within the right-of-way of improved streets, regardless of system design capacity.
2. In all areas other than residential where the bank line of an open channel, either natural or improved, would be within 30 feet of any existing or proposed habitable structure, regardless of system design capacity.
3. In residential areas where the bank line of an open channel, either natural or improved, would be within 60 feet of any existing or proposed residential structure.

Enclosed systems may be used to convey stormwater at all locations where open systems are permitted.

- B. Improved Channels:** Open systems consisting of improved open channels with intermittent culverts or bridges crossing streets and other surface areas may be used to convey stormwater in all areas except those excluded in the previous section. Lining of an improved channel is required in all developed areas where the 10% AP design discharge is equal to or greater than 200 CFS and less than or equal to 500 CFS.
- C. Natural Channels:** Existing natural channels may be retained in the drainage system of a developed area where the 10% AP peak discharge exceeds 500 CFS subject to the same exclusions as improved channels and with the additional requirement that the flow velocity of the 99% AP peak discharge does not exceed the following based on soils present in the channel bed and bank. Where design velocity exceeds the maximum, the channel should be improved as necessary or an enclosed system constructed.

<u>Soil Type</u>	<u>Max. Velocity of 1-Yr Peak Flow (fps)</u>
Fine sand, sandy loam	2
Silt loam, noncolloidal silts	3
Colloidal clays & silts, fine gravel	4
Coarse gravel, cobbles	5
Shale	6
Limestone bedrock	15

Additional easement and bank stabilization requirements are outlined in Sections 3.2 and 9.0, respectively.

- D. Overflow Systems:** As an integral part of the stormwater drainage system, whether enclosed or open, overflow channels shall be required in all areas in addition to, and above, the 10% AP conveyance elements. Each overflow component shall have sufficient hydraulic capacity, when combined with the capacity of the conveyance element, to convey the 1% AP peak discharge without damage to land or buildings.
1. The combined conveyance system shall provide sufficient capacity so that the 1% AP stage, plus 1 foot of freeboard, is at an elevation equal to or below the lowest elevation at which water may enter any proposed or existing building or structure.
  2. An overflow depth not exceeding seven (7) inches at the lowest point of the traveled way will be permitted where culverts cross streets.
  3. Permissible concurrent surface uses of overflow areas include lawns, gardens or other open uses; vehicular parking; or any other use not permanently obstructing the floodway.
  4. Prohibited concurrent surface uses include fencing; structures such as sheds, garages or outbuildings; materials storage; or any other use obstructing the floodway.

**E. Stormwater Detention Facilities:** Detention facilities shall be provided in connection with the development of land. Public and private detention facilities may be either wet or dry. Joint uses, such as parking and recreation, not interfering with detention functions are permitted for dry facilities. Rooftop and parking lot detention are acceptable for private facilities only.

**1.7 Existing Drainage System:** Existing drainage system component pipes, structures, and appurtenances within the project limits may be retained as elements of an improved system providing:

1. They are in sound structural condition.
2. Their hydraulic capacity, including surcharge, is equal to or greater than the capacity required by these criteria.
3. Easements exist or are dedicated to allow operation and maintenance.

Discharge from an existing upstream storm drainage system shall be computed in accordance with the requirements of these criteria. The computed discharge shall be used to design the new downstream system even though the actual capacity of the existing upstream system may be less.

**1.8 Waivers:** The City Engineer may waive specific criteria or requirements to provide specific types of stormwater facilities as follows:

**A. Detention Facilities:** Provision to provide detention may be waived in part or in whole provided one or more of the following are met:

1. Development is to discharge within a Federal Insurance Study defined 1% AP floodplain.
2. Developer provides downstream improvements to meet the tributary area peak discharge requirements to the satisfaction of the City Engineer.
3. Development cannot be fully and/or practically served by surface or underground detention facilities.
4. It is shown that construction of detention facilities will result in an increase of peak flow in the drainageway.

If detention requirement is waived for one of the above reasons, a pro-rated fee of \$9,000.00 per acre for R1 type development and \$12,300.00 per acre for all other development will be charged for all undetained areas. The fee will be adjusted at a rate of +3% per year with the first adjustment occurring on January 1, 2011. The fee may be offset by the construction of downstream improvements. The improvements must be approved by the city engineer, and the cost of such improvements will be set by the city engineer.

For the following development, detention is not required:

1. Additions to, improvements, and repair of existing single-family and duplex dwellings.
2. Construction of any buildings, structures, and/or appurtenant service roads, drives, and walks on a site having previously provided storm water control as part of a larger unit of development.
3. Additions, remodeling, repair, replacement, and improvements to any existing structure or facility and appurtenances that does not cause an increased area of impervious surface on the site in excess of 1,000 square feet of that previously existing.
4. Construction of any one new single-family or duplex dwelling unit, irrespective of the site area on which the same may be situated.

**B. Overflow Channels:** In previously developed areas, requirements to provide for 1% AP storm conveyance by means of overflow channels may be reduced in circumstances where 1% AP protection is not reasonably attainable due to the location of damageable improvements with respect to the drainage system.

**1.9 Amendments:** The City Engineer may amend these criteria as he deems necessary.

**1.10 Other References:** Other agencies have technical and administrative criteria and regulations pertaining to the design, permitting and operation of drainage systems which are in addition to and which may complement these criteria. When conflicts are encountered, the most rigorous criteria shall govern. Some of the more important references used in the preparation of this document include:

**A. American Public Works Association (APWA) Standard Specifications and Design Criteria:** The design criteria in this document is largely based upon national drainage standards outlined in American Public Works Association (APWA) "Standard Specifications and Design Criteria," and on Greene County, Missouri, Stormwater Design Standards modified to meet the City's requirements. Other specific references are contained throughout this document. The Criteria and Technical Design Aids contained in the Appendix provide specific references to their sources.

**B. Federal Insurance Agency - Floodplain Regulations and Implementing Ordinances Adopted by Municipalities:** Drainage systems designed within the limits of the designated 1% AP floodplain on the principal stream shall be designed to convey the flood as defined by applicable published floodplain information studies. For areas located in FIS Zone "A" outside the detailed study area, the developer shall prepare studies and calculations establishing the floodplain, elevation and width. These calculations shall be submitted to the reviewing agency for approval.

**C. Missouri Department of Natural Resource:** Rules and regulations of the Department of Natural Resources dealing with such issues as stream obstructions, channel changes, dams, and permits shall apply.

## 2.0 HYDROLOGIC CRITERIA AND METHODS

**2.1 Scope:** This section sets forth the hydrologic methods and parameters to be used for computations of runoff and peak rates to be accommodated by the storm drainage system.

**2.2 Computation Methods for Runoff.** Runoff rates to be accommodated by each element of the proposed storm drainage system shall be calculated using the criteria for land use runoff factors, rainfall, and system time outlined in the following sections. Computer models may be utilized so long as they produce calculated runoff to the system that is substantially the same as that calculated by the following criteria.

**A. Rational Method:** The Rational Method may be used to calculate peak rates of runoff to elements of enclosed and open channel systems, including inlets, when the total upstream area tributary to the point of consideration is less than 40 acres and does not include detention facilities. The Rational Method is defined as follows:

$$Q = C i A , \text{ where:}$$

Q = Peak rate of runoff to system in C.F.S.

C = Runoff Coefficient (from Table C)

i = Rainfall intensity in inches per hour

A = Tributary drainage area in acres, The tributary area is either the total upstream tributary area or the total upstream tributary directly connected impervious area.

Rainfall intensity, used only for the Rational Method, shall be as indicated in Table A corresponding to the calculated time of concentration for either the total tributary area or the directly connected impervious area. The greater of the computed flow rate for a) the total tributary area or b) the directly connected tributary area shall be used for design.

**B. Hydrograph Methods:** The application of hydrograph methods is required for all conveyance systems having greater than 40 tributary acres and for all detention facilities. Computer models or manual methods are permissible.

### 1. Acceptable computer models

- a. SCS Technical Release No. 55 (TR-55) - "Urban Hydrology for Small Watersheds," 2nd Edition, June, 1986.
- b. SCS Technical Release No. 20 - "Project Formulation - Hydrology," 2nd Edition, May 1983.
- c. U.S. Army Corps of Engineers, Hydrologic Engineering Center - "HEC-1 Flood Hydrograph Package," Version 4.1, June, 1998.
- d. U.S. Army Corps of Engineers, Hydrologic Engineering Center - "HEC-HMS, Hydrologic Modeling System," Version 3.3, (or newer) October 2008.

Copies of the above are available for purchase through National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, VA., 22161. The HEC-1 and TR-55 packages are also available through PC-TRANS Software Distribution Service, University of Kansas Transportation Center, 2011 Learned Hall, Lawrence, Kansas, 66045 and a number of other private software. U.S. Army Corps of Engineers programs are available for free from the Hydrologic Engineering Center web page.

**C. Rainfall:** Rainfall data for runoff computations are presented in Table B. For Hydrograph methods, rainfall shall be distributed in time using the appropriate Huff's Quartile distribution.

**2.3 Runoff Coefficients:** Runoff coefficients relative to development and land use shall be as indicated in Table C. The indicated "C" values are applicable to the Rational Method and the "CN" values to hydrograph methods.

The runoff coefficients given in Table C are appropriate for 20% or 10% AP events. Estimation of peak flows for less frequent storms requires the use of a higher runoff coefficient because infiltration and other abstractions have proportionately less effect on the amount of rainfall that becomes runoff. To obtain runoff coefficients for other frequency events, the "C" value from Table C is multiplied by a frequency correction factor. The frequency correction factor is 1.10 for the 4% AP event, 1.20 for the 2% AP event, and 1.25 for the 1% AP event. However, the resulting runoff coefficient (original "C" multiplied by the frequency correction factor) may not be greater than 0.98.

Coefficients shall be based on the more runoff-intensive surface condition of either planned future land use or existing developed land use. Future land use shall be defined by the City's adopted comprehensive land use plan.

Undeveloped areas not zoned, but for which future land use is defined by the City's land use plan, shall be assigned runoff coefficients for the land use indicated by such plan. Undeveloped areas designated as agricultural or those for which no specific future land use is indicated shall be assigned a minimum of 35 percent impervious surface for purposes of the design of storm drainage systems.

As an alternative to the coefficients and for areas not listed in Table C, a composite runoff coefficient based on the actual percentages of pervious and impervious surfaces shall be used.

**2.4 Time of Concentration (T<sub>c</sub>):** The time of concentration, T<sub>c</sub>, for hydrograph method analysis shall be calculated as the sum of the overland flow time, and the channel flow (travel) time. The time of concentration, T<sub>c</sub>, for the rational method shall be calculated as the channel travel time as described in 2.4.B, below. The total T<sub>c</sub> shall not be less than 5.0 minutes regardless of the calculated time.

**A. Overland Flow Time:** For Hydrograph methods only. Overland flow time is determined using the Kerby-Hathaway equation. The maximum sheet flow distance for calculations shall not be greater than 200 feet in developed areas and 300 feet in undeveloped areas.

$$T_{OL} = \left( \frac{0.667 \cdot n \cdot L_{OL}}{\sqrt{S_{OL}}} \right)^{0.467}$$

Where:  $T_{OL}$  is the overland flow time in minutes

$n$  is the overland flow roughness coefficient shown in Table 1

$L_{OL}$  is the representative length of the overland flow path in feet

$S_{OL}$  is the slope of the overland flow path in feet/foot

- B. Channel Flow (Travel) Time:** Determined from Kirpich equation. The "system" includes flow in street gutters, street ditches, enclosed pipe or box storm sewers, and improved or natural open channels.

$$T_{CH} = 0.0078 \cdot L_{CH}^{0.77} S_{CH}^{-0.385}$$

Where:  $T_{CH}$  is the channel flow time in minutes

$L_{CH}$  is the length of channel flow in feet. For hydrograph methods,  $L_{CH}$  is measured from the end of the hydraulically most remote overland flow path to the point of interest. For the Rational method,  $L_{CH}$  is measured from a) the hydraulically most remote point on the drainage divide to the point of interest or b) the hydraulically most remote point of the directly connected impervious area to the point of interest.

$S_{CH}$  is the slope of  $L_{CH}$  in feet per foot.

- C. Lag Time:** For use in the SCS Dimensionless Unit Hydrograph method, lag time shall be equal to 60 percent of the time of concentration ( $0.6 \times T_c$ ).

### 3.0 EASEMENTS

**3.1 General Requirements:** Developers shall be required to dedicate (plat) easements for all system components to be maintained by the City including enclosed pipe systems, improved channels, and public detention facilities as well as maintenance access connections to street rights-of-way. Easements are also required, although not for City maintenance purposes, along open channels and around private detention facilities as indicated below and in all other areas deemed necessary by the City Engineer.

#### 3.2 Permanent Drainage Easement Requirements:

- A. Enclosed Systems:** 15 feet minimum width or the structure/pipe O.D. plus 6 feet on each side.
- B. Improved Channels:** 30 feet minimum width or the top of bank width plus 10 feet on each side. The top of one bank shall have a minimum 10-foot wide strip graded for vehicle access with a maximum slope of 12 percent perpendicular to the contours.
- C. Detention Facilities:** 15 feet clear of any structure and 10 feet clear around the perimeter of the greatest of 1) the top of bank lines, 2) the 1% AP water-surface contour, or 3) 1 foot outside of security fences.

**3.3 Access Easements:** For facilities which are the City's responsibility, access easements for maintenance shall be connected to public street rights-of-way and shall not be spaced greater than 800 feet apart, public detention facilities. The maximum slope perpendicular to the contours shall be 12 percent. Access easements shall extend to the bottom of all improved channels with bottom widths greater than 7 feet and to the top of bank for narrower channels. These easements may overlay other permanent easements subject to maximum grade requirements.

**3.4 Flowage Easements:** Flowage easements shall be required in addition to and overlaying other permanent easements where applicable, including other public and private utility easements, where the 10% AP peak discharge exceeds 100 CFS. The flowage easement shall cover the overflow area for the conveyance element, whether open channel or enclosed system, determined as the 1% AP flood elevation plus one foot. Flood elevations shall be on file with the City and easement lines indicated on plats or permit plans. Limitations on permanent obstructions shall be included in the dedication with all other concurrent uses reserved to the property owner.

**3.5 Natural Channels:** For natural channels retained in the storm drainage system, permanent easements for undeveloped green space including the channel itself, shall be platted at a width of the 1% AP flood plain boundary plus 10 feet, or the top of bank width of the channel plus 10 ft. on each side, whichever is greater. (See Figure 3 for illustration.) These easements will be dedicated to the City but maintenance of the green space and the channel will be the responsibility of the individual property owner.

In lieu of dedicating the specified width of easement, bank stabilization may be constructed along the channel. For stabilized channels, easement requirements shall be the same as for improved channels. Refer to Section 9.0 for additional information on bank stabilization.

## 4.0 HYDRAULIC CALCULATION METHODS

4.1 **Pipes and Open Channels:** Flow shall be calculated by Manning's equation.

$$Q = \frac{A (1.486) (R^{2/3}) (S^{1/2})}{n}, \text{ where:}$$

Q = Discharge in cubic feet per second.

A = Cross sectional area of flow in square feet.

n = Roughness coefficient (see Table F).

R = Hydraulic radius (R = A/P) in feet.

S = Slope in feet per foot.

P = Wetted perimeter in feet.

Head losses, except friction losses, shall be calculated by

$$h = k (V^2/2g)^{1/2}, \text{ where:}$$

h = Head loss in feet.

V = Velocity of flow in feet per second at point of interest.

2g = 64.4 feet per second.

k = Coefficient (as shown in Table G).

4.2 **Street Gutters:** Flow shall be calculated by Izzard's formula, below. Figure 4 indicates a graphical solution for the formula.

$$Q = \frac{0.56 (z) (S^{1/2}) (D^{8/3})}{n}, \text{ where:}$$

Q = The gutter flow in cubic feet per second.

Z = The reciprocal of the average cross-slope, including gutter section in feet per foot.

S = The longitudinal street grade in feet per foot.

D = The depth of flow at curb face in feet.

n = Manning's "n" (see Table F).



The following formula shall be used to determine the street grade (Sx) at any point on a vertical curve for use in calculating gutter flow. Grades shall be "plus" when ascending forward and "minus" when descending forward with all grades in feet per foot.

$$S_x = S_1 + \frac{X}{L}(S_2 - S_1), \text{ where:}$$

Sx = The street grade on a vertical curve at point x.

S1 = The street grade at the PC of a vertical curve.

S2 = The street grade at the PT of a vertical curve.

X = The distance, in feet, from the PC of the curve to point x.

L = The total length of a vertical curve, in feet.

**4.3 Head Losses:** The following values for head losses in inlets, manholes and junction boxes may be used for design.

<u>Structure</u>	<u>Head Loss (ft)</u>
Inlet - One exit pipe only	0.5
Inlet - Thru flow @ less than 45° angle (one entry & one exit line)	0.1
Inlet - Thru flow @ greater than 45° angle (one entry & one exit line)	0.2
Inlet - Two or more entering lines	0.3

**4.4 Culverts:** Culvert flow capacity shall be calculated according to standard engineering practice.

**4.5 Computer Methods:** Computer models may be used for hydraulic calculations. For open channels the following models are permissible.

1. U.S. Army Corps of Engineers, Hydrologic Engineering Center - "HEC-2 Water Surface Profiles."
2. U.S. Army Corps of Engineers, Hydrologic Engineering Center - "HEC-RAS River Analysis System."
3. Federal Highway Administration - "HY-7 WSPRO - A Computer Model for Water Surface Profile Computations."

## 5.0 ENCLOSED SYSTEM DESIGN

**5.1 General Requirements:** All enclosed drainage system components (pipes, culverts and structures except bridges) shall be structurally designed for an H-20 live load, a unit weight of 120 pcf for soil cover, and minimum lateral earth pressure of 40 pcf equivalent fluid pressure. The lateral earth pressure shall be increased as necessary for special conditions when present on a project.

### 5.2 Pipes and Culverts:

- A. Minimum Cover:** Minimum cover over all pipes and culverts shall be equal to 1.5 feet unless otherwise approved by the Utility Supervisor.
- B. Minimum Size:** Minimum pipe size shall be 15-inch diameter.
- C. Downstream Conduit Size:** Conduit sizes, based on square feet of end area shall not decrease from upstream to downstream regardless of the calculated capacity of each conduit.
- D. Surcharge:** Surcharging of pipes under entrance control is permitted in structures subject to freeboard criteria for the structure and provision for pressure joints throughout surcharged lengths.
- E. Pipe Slopes:** Minimum invert slopes shall conform to the following:

Pipe Diameter (in)	Min. Invert Slope (%) for Round or Arch Pipe	
	RCP	CSP
15	0.32	0.64
18	0.26	0.52
24	0.17	0.34
30	0.13	0.26
36	0.10	0.20
42	0.08	0.16
48	0.07	0.14
54	0.06	0.12
60	0.05	0.10
72	0.05	0.10

### 5.3 Storm Sewer Inlets:

- A. Inlet Types:** Curb-opening inlets are preferred in street installations. Grated inlets may be used in addition to curb-opening inlets if necessary to control spread or depth of flow in the street. In off-street locations, only grated area-type inlets sized and designed for the specific location shall be permitted. Gutter deflectors shall be required for inlets installed on slopes greater than 4.0 percent.
- B. Configuration:** In street installations, the following dimensions apply to curb inlets.

Clear opening length	5.0 ft (min)
Clear opening height	5.0 in (min)
Clear inside width, perpendicular to curb line	3.0 ft (min)

Gutter depression depth at inlet	2.0 in (min)
Gutter transition length	
(a) Both sides in sump and upstream side on slopes	5.0 ft (min)
(b) Downstream side on slopes	3.0 ft (min)

**C. Capacity:** Inlet hydraulic capacity for new construction shall be determined from Table H for curb-opening inlets on slopes and from Figure 9 for curb-opening inlets in sumps. For area inlets in off-street locations, submit calculations based on specific inlet configuration, size, etc.

**D. Location Requirements:** Inlets shall be located along streets as required to limit the depth of flow in the gutters during the 10%AP discharge to the following:

<u>Street Class</u>	<u>Max. Width of Flow (ft)</u>
Undivided Streets (no median):	
<30 ft. back-to-back	10
30 to 35 ft. back-to-back	11
>35 ft. back-to-back	12
Divided Streets (with medians):	
Each directional roadway	As above
Intersections - all streets	6
Pedestrian Crosswalks - all streets	6

**E. Freeboard Requirements:** At inlets and other points of surface water entry into the enclosed drainage system, a minimum of 0.5-ft. shall be required between the peak design water surface elevation in the structure and the lowest elevation of the inlet opening. (Figure 10 illustrates the freeboard requirement). The water surface elevation in the structure shall be calculated as follows:

1. Invert elevation of the exit/outlet line (pipe), plus;
2. Depth (diameter) of the exit/outlet line (pipe), plus;
3. Minor losses, "h".

Minor losses shall be calculated by the equation,  $h = k * (V^2/2g)$  where the coefficient "k" is determined from Table G and "V" is the velocity of the exiting line determined by dividing the flow, Q, by the area, A, of the exiting line.

**F. Other Requirements:**

1. A minimum drop across the invert of inlets, manholes and junction boxes shall be required as follows:

For flow angle change equal to or less than 30°	0.1 ft.
For flow angle change greater than 30°	0.2 ft.
For three or more lines, all flow angles	0.3 ft.

2. The crown elevation(s) of pipe(s) entering a structure shall be at or above the crown of the pipe exiting the structure.
3. Maximum spacing of manholes for pipes less than 30 inches in diameter shall be 600 feet.

## 6.0 STREET CROSSINGS

**6.1 General Requirements:** The following requirements apply both to culverts and/or bridges on open channels and to enclosed system conduits which cross arterial streets (unless otherwise approved by the City Engineer):

**A. Hydraulic Capacity:** The hydraulic capacity of the culvert or conduit shall be the 4% AP peak discharge with 0.5 ft. minimum freeboard at the lowest point in the street gutter grade. The capacity of the culvert or conduit shall be increased as required to provide the 0.5-ft. minimum freeboard below the lowest point of entry to any existing upstream habitable structure.

**B. Overflow:** Overflow of the street is permitted at the 1% AP peak discharge with the depth of flow over the street not to exceed 0.6 ft.

**6.2 Enclosed Systems:** In addition to the same general requirements listed above, surcharge of the conduit is permitted.

## 7.0 ENERGY DISSIPATION

**7.1 General Requirements:** Energy dissipation shall be required where enclosed systems or detention basin spillways discharge to open channels with design discharge outlet velocities greater than the following.

<u>System Discharge Velocity (fps)</u>	<u>Receiving Channel Lining Type</u>
4.0	Natural, unlined
5.0	Constructed, turf-lined
7.0	Reinforced vegetation
12.0	Riprap or gabions
15.0	Concrete
15.0	Natural limestone

### 7.2 Structure Types:

- A. Pipes and Pipe-Arches ( $d \leq 24''$ ):** For pipes and pipe-arches less than 24 inches in diameter, either
1. Prefabricated end sections with cast-in-place toe walls, or
  2. Enclosed vertical drop structures in accordance with Figure 11.
- B. Enclosed System ( $Q < 100$  CFS):** For enclosed system structures having a design discharge capacity less than 100 CFS, one of the following.
1. Enclosed vertical drop structures in accordance with Figure 11.
  2. Bureau of Reclamation Basin VI impact basin - Figure 12.
- C. Enclosed System ( $100 \text{ CFS} \leq Q < 400 \text{ CFS}$ ):** For enclosed system structures having a design discharge greater than or equal to 100 CFS but less than 400 CFS, one of the following.
1. Bureau of Reclamation Basin VI impact basin - Figure 12.
  2. Bureau of Reclamation Basin IX baffled chute - Figure 13.
- D. Enclosed System ( $Q \geq 400 \text{ CFS}$ ):** For enclosed system structures having a design discharge greater than or equal to 400 CFS,
1. Bureau of Reclamation Basin IX baffled chute - Figure 13.
  2. Bureau of Reclamation Basin III SAF basin - Figure 14.

### 7.3 Channel Lining:

- A. Lengths:** Channel lining shall be required for a distance of 50 feet downstream from all energy dissipating structures. Where enclosed system pipes or structures, which are part of the major system, discharge into a channel, either improved or natural, at an angle greater than 15 degrees from the axis of the channel, lining shall be required for a distance of 30 feet along the channel, centered on the structure outlet. The major system is defined for the purposes of this paragraph as all drainage facilities equivalent to or larger than a 36-inch diameter pipe.
- B. Materials:** Acceptable lining materials are riprap, gabions, concrete or in-situ limestone.

## 8.0 IMPROVED CHANNELS

### 8.1 Geometric Criteria:

**A. Bottom Width:** The minimum bottom width for improved channels shall be 4.0 feet.

**B. Side Slopes:** The maximum side slopes for trapezoidal channels shall be as follows:

1. 4 horizontal to 1 vertical for turf or reinforced vegetative lining and the overflow channel area above the lining materials.
2. 2 horizontal to 1 vertical for all other lining materials except vertical concrete or gabion walls.
3. Flatter if necessary for stability of slopes.

**C. Alignment Changes:** Horizontal alignment changes shall be achieved by circular curves only having a minimum radius of:

$$R = \frac{V^2 W}{8D}, \text{ where:}$$

R = Radius of channel centerline, in ft.

V = Velocity of 10% AP design flow, in feet per second

W = Channel width at 10% AP water surface elevation, in ft.

D = Depth of 10% AP design flow, in ft.

### 8.2 Lining Height:

**A. Minimum Height:** Channel lining material shall extend above the channel invert to the depth of the 10% AP design discharge plus 6 inches of freeboard. The invert of all constructed channels shall be lined with concrete, riprap or gabions to a minimum height of 6 inches above the invert.

**B. Increase on Curves:** Along the outer side of horizontal curves, the lining height shall be increased as follows:

$$y = \frac{D}{4}, \text{ where:}$$

y = Increased vertical height of lining, in feet.

D = Depth of 10% AP design flow, in feet.

Increased lining height shall be transitioned from "y" feet to zero feet over a minimum of:

1. 30(y) feet downstream from the point of tangency (P.T.) of the channel curve.
2. 10(y) feet upstream from the point of curvature (P.C.) of the channel curve.

**8.3 Lining Material Requirements:** The following types of lining materials are acceptable alternatives based on the peak flow velocity in the channel. Other types of lining materials not specifically listed may be used when approved by the City Engineer.

<b><u>10% AP Peak Velocity (fps)</u></b>	<b><u>Permitted Lining Material</u></b>
> 12.0	Sound in-situ limestone Concrete Grouted riprap
>7.0 to 12.0	Sound in-situ limestone Concrete Grouted riprap Gabions Riprap
5.1 to 6.9	In-situ limestone Concrete Grouted riprap Gabions Riprap Reinforced turf above invert lining
5.0 and less	In-situ limestone Concrete Grouted riprap Gabions Riprap Reinforced turf above invert lining Turf above invert lining

**8.4 Optional Design for Improved Channels:** In lieu of sloping banks and linings as specified above, vertical walls may be constructed for improved channels conveying greater than 400 CFS at design discharge with the following requirements.

- A. Vertical Walls:** Shall be designed and constructed as retaining wall structures.
- B. Materials:** Acceptable materials for vertical walls are reinforced concrete or gabions.
- C. Wall Height:** The minimum wall height shall be the greater of 1.5 feet or the depth of the 1-year peak water surface plus 0.5 ft. The height shall be increased at transitions and bends.
- D. Fence:** Any vertical wall height 30” or greater shall be protected by 4 ft. high (or higher) chain link fencing installed along the wall lines on both sides of the channel.
- E. Access:** Adequate provisions shall be made for pedestrian entry/exit from the channel.

**8.5 Subdrainage for Linings:** All channel linings, except turf, shall provide for relieving back pressures and water entrapment beneath and/or behind the lining material.

**A. Materials:** The following are acceptable alternative methods for providing subdrainage.

1. Nonwoven geotextile filter fabrics.

2. Graded aggregate filter material with a minimum thickness of 4 inches and gradation based on filter design criteria.

**B. Weep Holes:** For concrete or riprap-lined channels, screened 4-inch diameter "weep holes" shall be required located at the base of the sloped sides, at a maximum spacing of 15 feet on-center.

**8.6 Diversions:** Proposed diversions of tributary areas greater than 0.5 acres may not have an adverse impact on downstream properties. Supporting computations for peak flow rates, channel capacities and water-surface elevations for both pre and post diversion conditions shall be submitted.



## 9.0 NATURAL CHANNELS

**9.1 Maintenance:** The developer and later the individual property owner(s) shall be responsible for maintenance of the entire area of the drainage easement to be dedicated or platted along all natural channels retained in the storm drainage system. This maintenance shall consist of removal of obstructions including debris and foreign objects; deadfall, drift and dead trees; trees on the banks with substantially undercut roots; and fences and other improvements. Trees to be removed shall be cut to within one foot of the ground line. Grubbing will not be required.

**9.2 Bank Stabilization:** Bank stabilization may be constructed along the entire channel length to minimize the easement width as specified in Section 3.2. Stabilization must be constructed where the required easements would otherwise extend off of the developer's property. The following requirements shall apply to the design of bank stabilization. (See Figure 15 for illustration of a typical installation.)

**A. Vertical Walls:** Vertical wall channels with lined inverts and gabion walls shall be provided. The criteria for improved vertical wall channels are applicable to this design except as modified in this section.

**B. Channel Bends:**

1. Bank stabilization shall be constructed with the convex (outside) side wall within the existing incised channel.
2. The channel shall be graded to the average clear width of the existing channel.
3. The minimum radius of the convex wall shall be as necessary to clear a 1.5:1 theoretical slope from the existing top of bank to the top of wall location.

**C. Wall Height:** The minimum wall height shall be the greater of 3.0 feet or the one-year peak discharge flow depth above the channel invert.

**D. Grading:** Grading shall be performed as required to 1) remove sloughage, if any, and to backfill to the top of the wall elevation on the convex, or high, bank side, and 2) to excavate the slopes above the top of wall to 2:1 or flatter on the concave, or low, side.

**E. Slope Cover:** Reinforced vegetative cover shall be planted on all graded slopes.

## 10.0 STORMWATER DETENTION

**10.1 Other Regulatory Requirements:** In addition to these criteria, the requirements of the Missouri Dam and Reservoir Safety Council shall apply to all detention dams greater than 35 feet in height. Such facilities shall be classified as Downstream Environmental Zone Class I and designed per MDNR regulations.

**10.2 Maximum Release Rates:** The detention facility allowable release rate shall be calculated with the assumption that the site is an undeveloped condition. The engineer shall use an appropriate time of concentration and curve number to fit that assumption.

### 10.3 Storage Volume Requirements:

**A. General:** Detention storage for all facilities shall be established by hydrograph routing methods. The volume shall be as required to limit the release rates to the maximums indicated in 10.2.

**B. Additional Requirements:** All detention facilities shall provide additional storage volume (beyond required flood storage) below the elevation of the principal spillway for five years of sediment accumulation in accordance with Figure 16. In addition, all facilities designed as wet basins shall provide permanent storage volume as necessary to maintain a minimum water depth of 3.0 feet.

### 10.4 Hydrograph Routing Methods:

**A. General:** Hydrograph routing is required for each return period to determine maximum inflow, detention volume and release rates.

**B. Rainfall Distribution:** To compute the design inflow hydrograph, Huff's Quartile Rainfall Distributions (50% curves) shall be used for developing the hydrographs. Durations of 1-hour, 2-hours, 3-hours, 6-hours, 12-hours and 24-hours shall be evaluated to determine the critical duration design event.

**C. Runoff Computation:** Runoff shall be computed by the SCS curve number method. Applicable curve numbers shall be obtained from Table C. The curve number shall be weighted by proportional land use in the tributary area.

**D. Routing Interval:** The routing time (hydrograph ordinate) interval shall be appropriate for the method used with a maximum time interval of 5 minutes unless otherwise approved.

**E. Routing Method:** Detention routing shall be by the storage-indication, or Modified plus, method.

**F. Required Steps:** In designing a detention facility, the following steps are required:

1. From proposed spillway characteristics, calculate rating curves of spillway stage vs. discharge.
2. Calculate detention stage vs. storage volume from pond configuration and depth.
3. Develop inflow hydrograph.
4. Perform storage routing through the proposed detention facility.

**G. Simplified Design:** A simplified design method is acceptable only for detention facilities having a tributary area of 10.0 acres or less.

1. The SCS TR-55 computer model may be utilized for computer methods.
2. By manual methods, use Figure 17 to determine required storage volume.

#### **10.5 Principal Spillways (Outlets):**

**A. General:** The principal spillway shall be designed to convey all discharge from the detention facility from the 1% AP and more frequent (inflow and discharge equal to or less than the 1% AP) storms and shall function without mechanical or electrical components.

**B. Hydraulic Characteristics:** The principal spillway shall have the hydraulic characteristics of a weir, pipe or orifice, or a combination of these. Pipes shall be a minimum of six inches in diameter except in parking lot and rooftop detention where the minimum size and configuration of opening shall be designed specifically for each condition.

**C. Capacity:** The spillway shall have sufficient capacity to discharge 80 percent of the detention storage volume within 24 hours after the peak inflow has entered the basin, excluding the water quality capture volume.

**D. Trash Racks:** Trash racks, screens, etc., shall be provided at the principal spillway as necessary to keep the facility fully operational.

#### **10.6 Emergency/Overflow Spillways;**

**A. Required Installations:** Emergency spillways shall be required for all detention facilities formed by earth embankments or dams greater than 10.0 feet in height.

**B. Return Period for Operation:** Emergency spillways shall operate only for storms less frequent (higher inflow and discharge) than the 1% AP storm.

**C. Regulatory Criteria:** The Missouri Dam and Reservoir Safety Council criteria shall apply to the design of emergency spillways with sufficient capacity to discharge the 0.5\*6-hour PMP hydrograph without overtopping the dam.

**D. Exemptions:** Emergency spillways are not required for

1. Excavated detention basins.
2. Detention basins on structure roofs.
3. Detention basins utilizing surface parking areas.

#### **10.7 Other Requirements:**

**A. Wet Basins:** The design of wet detention facilities shall include the following:

1. Provisions for complete drainage to permit sediment removal and other periodic maintenance activities.
2. The limits of maximum ponding shall be no closer than 30 feet horizontally and no less than two feet below the lowest sill elevation of any habitable building or structure.

3. The entire area covered by fluctuating water levels shall be seeded, fertilized and mulched, sodded, or otherwise surfaces to protect against erosion.
- B. Dry Basins:** Dry detention facilities with storage on other than roofs or paved surfaces shall conform to the following:
1. The bottom shall be graded at a minimum of 2 percent to drain across grass. A minimum of 0.5 percent slope may be used if an interior trickle channel is installed. The trickle channel shall be 4.0 feet or greater in width.
  2. The limits of maximum ponding shall be no closer horizontally than 10 feet to a habitable building or structure unless waterproofing of the building and pedestrian access areas to the building are properly documented.
  3. Vertically, the limits of maximum ponding shall not be less than two feet below the lowest sill elevation of any adjacent building.
  4. The entire basin shall be seeded, fertilized and mulched, sodded or paved.
- C. Side Slopes:** Slopes on the banks, dams, dikes or berms around and forming the basin shall not be steeper than 3 horizontal to 1 vertical (3:1) for all excavation or embankment slopes. Flatter slopes shall be required if necessary for stability with a safety factor of 2.0 for dams greater than 10 feet in height, and 1.5 for all other slopes.
- D. Open Channels.** Normally-permitted open channels may be used as detention areas provided that:
1. The limits of maximum ponding conform to the requirements for both wet and dry basins.
  2. The maximum depth of detention does not exceed four feet.
  3. The minimum flow line grade is 0.5 percent.
  4. The maximum side slopes of the detention area are 3:1 in trapezoidal channel sections. For other channel sections, features shall be designed in consideration of safety, stability and ease of maintenance.
  5. The entire detention area is seeded, fertilized and mulched, sodded or paved.
  6. No ponding occurs within public rights-of-way without specific written approval of the City Engineer, and the hydraulic elevations resulting from channel detention do not adversely affect adjoining properties.
- E. Erosion Control:** Principal spillways and outlet works, as well as conveyance system entrances to detention basins, shall be equipped with energy dissipating devices as necessary to limit the peak discharge velocity in conformance with Section 7.0.
- F. Rooftop Detention:** Detention storage may be met in total or in part by detention on roofs. Details of such designs shall include the depth and volume of storage, details of outlet devices and downdrains, and elevations and details of overflow scuppers. Connections of roof drains to sanitary sewers are prohibited. Design loadings and special building and structural details shall be subject to approval by the City Engineer. Rooftop detention areas are exempt from sediment storage requirements.
- G. Parking Lot Detention:** Paved parking lots may be designed to provide temporary storage of storm water on a portion of their surfaces as follows:
1. Detention areas shall not be located in a primary parking lot which is defined as the most accessible 80 percent of the total parking for a facility.
  2. Depth of storage shall be limited to a maximum of 12 inches.

3. The maximum limits of ponding are no closer horizontally than 10 feet to any building unless waterproofing of the structure and pedestrian access to the building are documented, and vertically not less than two feet below the lowest building sill elevation.
4. Retaining walls or curbs used to contain storm water in parking lots must be constructed of reinforced concrete.
5. Parking lot detention areas are exempt from sediment storage requirements.

## **10.8 Construction, Operation and Maintenance:**

**A. Easements:** Access and permanent drainage easements shall be required as outlined in Section 3.

**B. Public Facilities:**

1. Public detention facilities shall be constructed by the developer where approved by the City and after plan approval and issuance of a permit. Dedication of easements to the City will be required.
2. Regional detention facilities may be dedicated as public facilities upon conceptual approval of the location and final approval of the design and construction by the City.
3. Operation and maintenance shall become the responsibility of the City after dedication of the easements and acceptance of the facility by the City.

**C. Private Facilities:**

1. Private detention facilities shall be constructed by the developer or property owner after plan approval and issuance of a permit by the City. Dedication of permanent drainage easements to the City will be required.
2. Operation and maintenance of private detention facilities shall be the responsibility of the property owner and successors.

**D. Maintenance Activities:** For both public and private drainage facilities, required maintenance activities include but are not limited to, debris removal and cleaning, cutting of vegetation that impairs the function of the structure or otherwise creates a public nuisance, repair of erosion, removal of silt, and maintenance of structural facilities including outlet works.

**E. Construction Record Drawings:** Construction record drawings showing as-built elevations and dimensions for detention structures are required. Both grading and outlet structure as-built data is to be submitted. Construction record drawings shall have field-verified dimensions and elevations noted by revision clouds.

## 11.0 DRAINAGE PLAN REQUIREMENTS

**11.1 General:** This section governs the preparation of drainage plans which shall include all information, including drawings, and calculations concerning a subdivision's internal storm water systems; the method of handling off-site drainage; and the discharge of runoff from the proposed subdivision. The drainage plan shall be prepared by a registered professional engineer in accordance with the requirements contained herein and shall be submitted to the City Engineer for review and approval.

**11.2 Required Information:** The drainage plan shall conform to the following requirements and show the indicated information on the drawing(s).

- A. Scale:** The drainage plan shall be prepared at 1" = 100' or larger unless otherwise approved by the City Engineer.
- B. Identification:** The drawing shall specify the subdivision, landowner, developer, engineer and date of submittal.
- C. Contours:** A contour interval of 1 foot or 2 feet is acceptable. All existing topography shall also be included with the date of topo survey indicated.
- D. Bench Marks:** At least one (1) bench mark adjacent to or within the proposed subdivision shall be shown on the drainage plan. Use Mean Sea Level (MSL) datum/National Geodetic Vertical Datum (NGVD).
- E. Plat Layout:** The outline of all lots and blocks plus all drainage easements, dedications and reserves shall be shown. Lot dimensions, setback lines and utility easements are not required.
- F. Storm Sewers:** All storm sewers shall be shown with the following data:
  - 1. Pipe size or diameter (inches).
  - 2. Inlet sizes - length and width (feet).
  - 3. Drainage basin and sub-basin boundaries.
  - 4.  $Q_{10}$  for each sub-basin/inlet.
- G. Channels:** Improved channels shall be depicted on the drainage plan with the following data indicated.
  - 1. Channel slope.
  - 2. Bottom width (feet).
  - 3. Side slopes.
- H. Detention Areas:** All detention areas as required by these regulations shall be shown on the drainage plan with the following data.
  - 1. Static pool elevation where applicable.
  - 2. Maximum water surface elevations for the 50%, 10% and 1% AP storms.
  - 3. Discharge rates for the 50%, 10% and 1% AP storms.
  - 4. Size and type of control structure.

- I. FEMA Data:** The limits of the FEMA floodway and floodplain shall be shown along with the appropriate base flood elevations (BFE). Where new subdivisions are proposed adjacent to unstudied or nondetailed studied streams, the developer shall submit the appropriate backwater (HEC-2) calculations, encroachment analysis, and floodway data to be submitted to FEMA for review and approval.
- J. Minimum Pad Elevations:** Minimum pad elevations shall be shown for each lot adjacent to natural streams, improved channels or detention areas.
- K. Off-Site Drainage:** All off-site drainage areas which discharge into the subject subdivision shall be labeled with the basin size, in acres, and the 50%, 10% and 1% AP runoff rates, or peak flows.
- L. Street Grades:** Preliminary street grades and elevations at sumps and crests shall be shown on the drainage plan using arrows to indicate direction of drainage flows.
- M. Permits:** Indicate on the drainage plan all permits required by local, state and federal agencies and the status of each one.
- N. Drainage Calculations:** All calculations supporting the drainage plan as required herein shall be submitted to the City Engineer for review and approval.

**11.3 Document Format:** The drainage plan shall be a complete, bound document containing all drawings and supporting calculations. Pockets shall be provided for drawings to allow easy removal. All data shall be organized in such a manner as to allow a systematic and timely review. A minimum of two (2) copies of the document shall be submitted to the City at the time of final plat application.

## 12.0 CONSTRUCTION PLAN REQUIREMENTS

**12.1 Scope:** This section governs the preparation of plans for storm water system projects.

**12.2 General:** The plans shall include all information necessary to build and check the design of storm drainage systems. The plans shall be arranged as required by the City Engineer. Standard details of the City may be included by reference. Plans shall be sealed by a registered professional engineer and shall be submitted to the City Engineer for review and approval.

**12.3 Scale:** Plans shall be drawn at the following minimum scales. Larger scales may be needed to clearly present the design. Bar scales shall be shown on each sheet for each scale.

<b>Plan:</b>	1-inch	=	50 feet
<b>Profile</b>			
<b>Vertical:</b>	1-inch	=	5 feet
<b>Horizontal:</b>	1-inch	=	50 feet
<b>Drainage Area Map</b>			
<b>On site:</b>	1-inch	=	200 feet
<b>Off site:</b>	1-inch	=	1,000 feet
<b>Structural Plans:</b>	1/4-inch	=	1 foot
<b>Graphic Drawings:</b>	Varies		
<b>SWPPP Drawings:</b>	Varies		

### 12.4 Required Information:

**A. Drainage Area Map:** A drainage area map shall include and shall indicate the following:

1. Ridge line of the area tributary to each principal element of the system.
2. The area in acres.
3. The runoff coefficient "C" or "CN" for each area.

**B. Plan View:** All designed storm drainage systems shall be drawn in plan view and shall contain the following:

1. North arrow and bar scale.
2. Ties to permanent reference points for each system located outside of the street right-of-way.
3. Identification and location of each pipe, culvert, inlet, structure and existing utility affecting construction.
4. Right-of-way, property, and easement lines, and the 1% AP flood-plain and setback from the top of bank of an open channel to any building.
5. Existing man-made and natural topographic features, such as buildings, fences, trees, channels, ponds, streams, etc., and all existing and proposed utilities.
6. Location of test borings.
7. Existing and finish grade contours at intervals of 2.0 feet or less indicating existing and finish grades and slopes.
8. A uniform set of symbols and abbreviations subject to approval by the City Engineer.
9. The centerline of open channels within 50 feet of an enclosed drainage system and showing the direction of flow.



**C. Profile View:** All designed storm drainage systems shall be drawn in profile view and shall contain the following:

1. Existing and finish surface grade along the centerline of pipe except street centerline may be used when construction includes street construction.
2. Length, size and slope of each line or channel segment. Slope shall be expressed in percent.
3. Headwater elevation at the inlet end of each culvert.
4. Flow line (invert elevation in and out) at each structure.
5. Each existing utility line crossing the alignment shall be properly located and identified as to type, size and material.
6. Test borings.
7. All station and invert elevations of manholes, junction boxes, inlets or other structures.
8. The profile shall show existing grade above the centerline as a dashed line and proposed finish grades or established street grades by solid lines. It shall also show the flow line of any drainage channel, either improved or unimproved, within 50 feet on either side of the centerline. Each line shall be properly identified. The proposed storm sewer shall be shown as double solid lines properly showing the top of the pipe.
9. All manholes, inlets or other structures shall be shown and labeled with appropriate "Standard Drawing" designation, if applicable.

**D. Design Information for Each Part of the System:** The plans shall present design information for each culvert, structure, facility, pipe and channel segment and shall contain the following:

1. Tributary area in acres.
2. Design discharge and capacity in cubic feet per second.
3. Runoff coefficient "C", design storm return frequency, rainfall intensity and Manning's "n" value.
4. Discharge velocity at design flow.
5. Hydraulic grade line.
6. Type and grade of material (gage, class, etc.).

Schedules which indicate all variable dimensions and elevations covered by standards or "typical" drawings shall be shown on the plans. All design details for nonstandard structures shall be indicated on the plans. A minimum of one plan view and one sectional view shall be shown on the plans for each type of structure. Additional views may be required if necessary to clearly define the design. A reinforcing bar list is not required; however, the grade, type, size and location of the bars shall be clearly indicated on the plans.

**E. Stormwater Pollution Prevention Plan (SWPPP):** The SWPPP shall present information for each erosion and sediment control structure, construction entrance location and dimensions, construction sequence, seeding specifications and BMP details.

## 13.0 WATER QUALITY PROTECTION

### 13.1 Introduction

This section covers the design of Best Management Practices (BMPs) to minimize the adverse effects of urban stormwater runoff on the quality of receiving waters.

It is recognized that specific water quality standards, other than those contained in the Missouri Clean Water Laws, have not been developed or adopted for these receiving waters. The objective of this policy is not to meet specific reductions of targeted pollutants, but rather to provide a generally effective level of pollutant removal by using reasonable, cost effective measures. The goal is to minimize, to the maximum extent practical, adverse impacts on the quality of the receiving waters.

It is important to recognize that the *structural Best Management Practices* (BMPs) for which design guidance is given in this section represent only one aspect of stormwater quality management. The most effective means of managing stormwater quality lie in overall watershed planning and zoning controls, and other *nonstructural* practices which are generally beyond the control of an individual development.

Data from communities across the country has shown that, as the total impervious area in a watershed exceeds ten to fifteen percent (10-15%), water quality declines unless mitigative measures are taken. The most important management tool is to limit the impervious area in these watersheds to these values. While these limits may be attainable for the watershed as a whole, they may not be possible for individual development or sub-basins. Structural BMPs will be required for these developments.

### 13.2 General Design Guidelines

- A. Minimize the amount of runoff.** The total quantity of pollutants transported to receiving waters can be minimized most effectively by minimizing the amount of runoff. Both the quantity of runoff and the amount of pollutant wash-off can be minimized by reducing the amount of *directly connected impervious area (DCIA)*. Impervious areas are considered connected when runoff travels directly from roofs, drives, pavement, and other impervious areas to street gutters, closed storm drains or concrete, or other impervious lined channels. Impervious areas are considered disconnected when runoff passes as sheet flow over grass areas, or through properly designed BMPs, prior to discharge from the site.
- B. Maximize contact with grass and soil.** The opportunity for pollutants to settle out is maximized by providing maximum contact with grass and soil. Directing runoff over vegetative filter strips and grass swales enhances settling of pollutants as the velocity of flow is reduced. Infiltration of runoff into the soil is also increased.
- C. Maximize holding and settling time.** According to ASCE ([Reference 13.1](#)), the most effective runoff quality controls reduce the runoff peak and volume. The next most effective controls reduce peak runoff rates only. For small storms the runoff rate should not exceed the pre-project peak flow rate from the fifty percent (50%) AP (2-year) storm. Most obnoxious pollutants (exceptions include water soluble nutrients and metals) can be settled out. By reducing the rate of outflow and increasing the time of detention storage, settling of pollutants and infiltration of runoff is maximized.

- D. Design for small, frequent storms.** Drainage systems for *flood control* are designed for large, infrequent storm events. In contrast, stormwater quality controls must be designed for small, frequent storm events. In the Cartersville area, eighty-six percent (86%) of all twenty-four (24) hour rainfalls are one inch (1") or less (see [Figure 5](#)). Most pollutants are washed off in the "first flush", generally considered the first one-half inch (½") of runoff.
- E. Utilize BMPs in series where possible.** Performance monitoring of BMPs in Florida, Maryland, and Delaware has shown that the combined effect of providing several BMPs in a series can be much more effective in reducing the level of pollutants than providing a single BMP at the point of discharge. To the greatest extent practical, runoff should be directed first to vegetative filter strips, then to grass swales or channels, and then to extended detention basins, sand filters, etc.
- F. Incorporate both flood control and water quality objectives in designs, where practical.** Incorporating both flood control and water quality criteria into a single stormwater management facility is not only possible, but is encouraged. Whenever practical, combining several objectives, such as water quality enhancement and flood control, maximizes the cost-effectiveness of stormwater management facilities.

**13.3 Requirements:** The following requirements will apply to all development.

- A.** Stormwater runoff from any new development for which the total impervious area exceeds ten percent (10%) of the total land area of the development must be directed through an extended wet or dry detention basin, or other properly designed BMP, prior to discharge from the site.
- B.** Runoff from fueling areas and other areas having a high concentration of pollutants will be required to be directed to a sand filter or other properly designed BMP which provides filtration as well as settling.
- C.** The required volume for capture and treatment shall be designed as the *water quality capture volume* (WQCV), and shall be determined as set forth in [Section 13.4.1](#).
- D.** Detention storage must be provided to limit the peak flow rate from the fifty percent (50%) AP (2-year) storm to pre-project values. Detention facilities for peak flow control shall be designed as set forth in [Section 10.0](#).

### 13.4. Design Criteria

#### A. Water Quality Capture Volume

Water quality BMPs shall be designed to capture the runoff from the 86<sup>th</sup> percentile rainfall for the Cartersville area as well as to capture the first flush of pollutants from directly connected impervious areas within the proposed development.

The required water quality capture volume (WQCV) to be used in design of extended wet and dry detention basins and other BMPs whose design is based upon capture and treatment of storm water, shall be the greater of the following:

- 1) the first one-half inch ( $\frac{1}{2}$ " ) of runoff from the directly connected impervious area (DCIA) in the development, or
- 2) the *runoff* resulting from total rainfall depth of one inch (1") in twenty-four (24) hours over the entire development.

### 13.4.B. Directly Connected Impervious Area

Impervious areas are considered connected when runoff travels directly from roofs, drives, pavement, and other impervious areas to street gutters, closed storm drains or concrete, or other impervious lined channels. Connected and disconnected impervious areas are illustrated in [Figure 33](#).

In order for an impervious area to be considered disconnected, runoff from the area must pass through a vegetative filter strip or other BMP meeting the requirements set forth in this section.

For determining the amount of impervious area, the following assumptions shall apply in the absence of more detailed data:

#### Single Family Lots

Average roof area:	2500 square feet
Average drive area:	800 square feet
Average impervious area per lot:	3500 square feet

If gutter downspouts are directed to drain toward lawn areas, seventy-five percent (75%) of the roof area shall be considered disconnected.

#### Duplexes and Patio Homes

Average roof area:	2500 square feet
Average drive area:	1600 square feet
Average impervious area per lot:	4500 square feet

If gutter downspouts are directed to drain toward lawn areas, seventy-five percent (75%) of the roof area shall be considered disconnected.

#### Multi-Family, Commercial and Other Areas

The amount of impervious area contained in multi-family, commercial, office and manufacturing developments shall be determined based upon the site plan for the development.

### 13.4.C. Vegetative Filter Strips

Vegetative filter strips consist either of areas of undisturbed vegetation in good condition, including trees, grass, sod or other vegetative cover which meets the objectives for this BMP, or areas where new vegetation has been established. Vegetative filter strips shall be provided in areas of sheet flow only. The hydraulic loading for filter strips shall not exceed 0.05 cfs per lineal foot of filter strip length for the fifty percent (50%) AP (2-year) storm (equal to the runoff per unit width from a four hundred feet (400') length of impervious area).

The minimum width of the filter strip shall not be less than twenty percent (20%) of the length of the sheet flow from the upstream impervious surface, and in no case shall be less than six feet (6'). The slope along the width of the filter strip shall not exceed 4:1 (25%).

Typical details for vegetative filter strips are shown in [Figure 34](#).

#### **13.4.D. Grass Swales**

Grass swales may be provided to convey runoff from vegetative filter strips and impervious areas to BMPs designed for capture and temporary storage of runoff. Design criteria for grass swales shall be as follows:

Maximum side slopes: 4:1.

Maximum longitudinal slope: 5%.

Minimum longitudinal slope: 1%.

Maximum velocity: 2 feet per second for peak flow from the 50% AP (2-year) storm.

Grass swales shall be lined with sod or seeded and covered with suitable erosion control blanket and mulch.

Typical details for grass swales are shown in [Figure 35](#).

#### **13.4.E. Extended Dry Detention Basins**

Extended dry detention basins may be provided to capture and provide temporary storage for the required water quality capture volume. Extended dry detention basins shall be placed outside of the primary watercourses which allow off-site flows to pass through the development (i.e., "off-line") where possible.

Design criteria for extended dry detention basins shall be as follows:

Volume: Minimum volume shall be one hundred and twenty-five percent (125%) of the required water quality capture volume (WQCV). Detention basins for water quality may be combined with detention basins for flood control. Effects of the WQCV may be considered in the design for flood control.

Drain time: The WQCV shall be released over a minimum period of twenty four (24) hours and a maximum period of seventy-two (72) hours.

Outlet structure: Outlet structures shall consist of a perforated riser pipe, outlet pipe and gravel filter material as shown in [Figures 36](#) and [37](#). The minimum allowable riser pipe diameter is eight inches (8"). The riser pipe shall be connected to an outlet pipe of equal or greater diameter. The outlet pipe shall have adequate capacity to carry the maximum rate of flow from the riser pipe. Material for the riser pipe shall be Schedule 40 PVC, ductile iron, or corrugated, galvanized metal.

A removable cap shall be provided at the top of the riser pipe. The cap shall have a one inch (1") diameter hole for air relief.

The outlet pipe shall be bedded in firmly compacted clay, free of stones. For dams exceeding ten feet (10') in height, an anti-seep collar shall be provided around the pipe.

Number of rows of perforations, number of perforations per row and diameter of perforations for the riser pipe shall be specified on the plans. Perforation pattern shall be determined based upon orifice calculations to provide for release of the WQCV over the specified time. Perforations shall meet the following requirements:

Minimum perforation diameter:	1/4 inch
Maximum perforation diameter:	1 inch
Minimum number of holes per row:	4
Maximum number of holes per row:	8
Minimum row spacing:	4 inches
Maximum row spacing:	12 inches

Freeboard: Where the basin is to be utilized as a water quality BMP only, twelve inches (12") minimum freeboard shall be provided above the WCQV.

Forebay: It is preferred that a forebay be provided to dissipate energy from incoming flows and to trap settleable sediment entering the basin. The forebay should be separated from the remainder of the basin by an earth dike meeting the requirements of Section 10. The top of the dike shall be set six inches (6") above the stage of the WQCV. Outflow from the forebay to the basin shall be through a gravel filter meeting the requirements of Section 14.5.2 (Figure 24). The top of the gravel filter shall be set equal to the stage of the WQCV.

The volume of the forebay shall be a minimum of ten percent (10%) and a maximum of twenty percent (20%) of the WQCV. The volume of the forebay is considered to be part of the required WQCV, not additional volume.

General construction requirements: The optimal length to width ratio for a water quality detention basin is four (4). The length to width ratio should be no less than two (2). The minimum allowable length to width ratio is one (1). Side slopes, dams or dikes, and retaining walls shall meet the requirements of Section 10.

Overflow spillways: Where the basin is to be utilized as a water quality BMP only, a spillway or outlet structure meeting the requirements of Section 10 and capable of passing the peak flow from a 1% AP (100-year) storm for the drainage area upstream of the basin, shall be provided. The lowest point on the spillway or outlet structure shall be set at the top of the WCQV.

Trickle channels: Trickle channels shall be provided to provide grade control and to minimize chronic wet areas. Trickle channels shall be constructed of six inch (6") stone or other porous medium. A typical trickle channel cross section is shown in Figure 37.

A typical plan and section for extended dry detention basins are shown in Figure 38.

#### **13.4.F. Extended Wet Detention Basins**

Extended wet detention basins may be provided to capture and provide temporary storage for the required water quality capture volume. Extended wet detention basins shall be placed outside of the primary watercourses which allow off-site flows to pass through the development (i.e., "off-line") where possible.

Design criteria for extended wet detention basins shall be the same as for extended dry detention basins, with the following exceptions:

The volume of the permanent pool should not be less than 1.0 to 1.5 times the WQCV.

A bench area (littoral zone) with a width of ten feet (10') shall be provided as shown in [Figure 13.8](#). It is preferred that emergent aquatic vegetation be provided in this zone.

It is recommended that a minimum of twenty-five percent (25%) of the WQCV be provided in the upper eighteen inches (18") of depth. A maximum of fifty percent (50%) of the permanent pool volume shall be provided in the upper eighteen inches (18") of depth.

Depth of the principal portion of the permanent pool shall be a minimum of four feet (4').

It is preferred that a forebay meeting the same requirements as specified for dry detention basins, be provided.

Where perforated riser pipes are not encased in gravel, only corrugated metal or ductile iron pipe may be used.

Typical details for extended wet detention basins are shown in [Figure 39](#).

#### **13.4.G. Sand Filters**

Runoff from fueling plazas, vehicle maintenance areas, solid waste storage or transfer areas, and other areas having potentially high concentrations of contaminants shall be passed through a sand filter prior to discharge to receiving waters.

Total impervious area draining to a sand filter will generally be one (1) acre or less. Sand filters shall be provided with a sedimentation chamber and a filtration chamber. Design of sand filters shall be based upon the Austin, Texas first flush filtration basin (full sedimentation design) as described in Debo and Reese pp. 596-598 ([Reference 13.2](#)). A schematic cross section of a sand filter is shown in [Figure 40](#).

#### **13.4.H. Other Structural BMPs**

Constructed wetlands, porous pavements and other structural BMPs for which detailed design criteria can be documented in generally accepted literature can be provided in addition to, or in lieu of, the BMPs described above, provided the objectives of this section can be met. The use of infiltration basins and trenches is discouraged due to possible adverse impacts on groundwater.

### **13.5 Operation and Maintenance**

The City of Carterville provides no maintenance of water quality BMPs located on private property. Maintenance must be provided by the owner of the property upon which the BMP is located. Maintenance includes, but is not limited to, removal of debris, control of vegetation, removal of accumulated sediment when the WQCV volume has been reduced by 25% or more.

Extended detention basins and wetlands or other “capture and storage” BMPs shall be located within a single lot or property, within a designated drainage easement. Where BMPs are located in common areas or adjoining off-site areas, the property upon which the BMP is located shall remain in the ownership of the developer or property owners’ association.

Where a property owners’ association is formed, restrictive covenants which provide for collection of fees for maintenance of the BMPs shall be filed in the office of the Jasper or Newton County Recorder of Deeds, as appropriate. Restrictive covenants must be approved by the County legal counselor prior to filing of the final plat.

### **13.6 References**

1. American Society of Civil Engineers, Manuals and Reports of Engineering Practice No. 77 (WEF Manual of Practice FD-20), Design & Construction of Urban Stormwater Management Systems, Chapter 12. American Society of Civil Engineers, New York, NY, 1992.
2. Debo, T.N. and Reese, A.J., Municipal Stormwater Management, Chapter 13, Lewis Publishers, Boca Raton, FL, 1995.



## SECTION 14 - EROSION & SEDIMENT CONTROL

**14.1 Introduction:** The purpose of this section is to provide detailed design criteria and standards for the design of erosion and sediment control measures as required by the City of Carterville's National Pollutant Discharge Elimination System permit.

**14.2 General Guidelines:** The goal of the regulation is to effectively minimize erosion and discharge of sediment from construction sites by application of relatively simple and cost effective Best Management Practices (BMPs). General guidelines for erosion and sediment control are listed below. Sediment and erosion control plans must demonstrate consistency with these guidelines.

- Minimize the area disturbed by construction at any given time.
- Stabilize disturbed areas as soon as possible by re-establishing sod, other forms of landscaping, and completing proposed structures, pavements, and permanent storm drainage systems.
- Provide for containment of sediment until areas are stabilized.
- Provide permanent erosion control by constructing and maintaining the permanent storm drainage system and maintaining vegetative cover, pavements, and other surface coverings in good condition.
- Avoid environmentally sensitive areas. Streams, springs, sinkholes, lakes, or wetlands are easily affected by sediment from construction sites. Careful planning and additional controls are needed when construction site are located in, or in close proximity, to these areas.
- Recognize sheet flow vs. concentrated flow. In areas where runoff occurs primarily as sheet flow, containment of sediment is relatively simple. In these areas, straw or hay bales, silt fences, and vegetative filter areas can be very effective. Where flow is concentrated, containment of sediment becomes more difficult as the rate and volume of flow increase. In these areas, more elaborate controls such as sedimentation basins must be provided.
- Recognize temporary vs. permanent controls. The greatest potential for soil erosion occurs during construction. Temporary controls are those which are provided for the purpose of controlling erosion and containing sediment until construction is complete. Temporary controls include straw or hay bale dikes, silt fences, erosion control blankets, etc., which are not needed after the area is stabilized. Permanent controls consist of vegetative cover, riprap, concrete trickle channels, detention basins, etc., which will remain in place through the life of the development. It is possible for the same feature to serve both a temporary and permanent purpose. The difference between temporary and permanent erosion control should be clearly recognized in preparing an erosion and sediment control plan.

## 14.3 Grading Permits

### A. Grading Permit Requirements.

A Grading Permit must be obtained before any land is graded for non-agricultural purposes.

Grading is defined as any excavation or filling or combination thereof. Grading of agricultural land is considered non-agricultural whenever soil is excavated for sale off the site or soil from other properties is brought onto the site.

The Utility Supervisor may waive the requirement for a Grading Permit in the following cases:

1. Sites where one (1) acre or less is graded, provided the graded area is located a distance of twenty-five feet (25') or more from a spring, sinkhole, cave, wetland, watercourse, or floodplain, and where the proposed construction does not include the construction of stormwater detention basins or other drainage facilities.

NOTE: Lots in new subdivisions will be considered part of the entire subdivision site area.

2. The following activities (provided they are not located within twenty-five feet (25') of a spring, sinkhole, cave, wetland, or watercourse):
  - a. Grading for single family residences.

NOTE: Lot grading done as a part of an overall subdivision plan in order to make lots buildable or prepare lots for sale is not exempt.

- b. Grading and repair of existing roads or driveways.
  - c. Cleaning and routine maintenance of roadside ditches or utilities.
  - d. Utility construction where the width of the disturbed area for trench excavation and backfill is twenty feet (20') or less.
3. Emergency construction required to repair or replace roads, utilities, or other items affecting the general safety and well being of the public.

For emergency construction sites which would otherwise be required to obtain a permit and for which remedial construction will take more than fourteen (14) calendar days, application for the permit must be made within three (3) calendar days from the start of construction.

### B. Permit Procedure

The following items must be submitted prior to issuance of a Grading Permit:

1. Completed grading permit application signed by the property owner or his legally authorized agent.
2. Grading permit fee. Checks must be made payable to Carterville City Clerk.

3. An approved sediment and erosion control plan (SECP).
4. Performance bond or other required security.
5. For sites where one (1) acre or more of land are disturbed the following additional items are required:
  - a. A copy of the Missouri State Operating Permit.
  - b. An approved Stormwater Pollution Prevention Plan (SWPPP).
6. Other State or Federal permits, if required (see Section 14.4).

The submittal and approval procedure is as follows:

1. Subdivisions

A sediment and erosion control plan (SECP) shall be submitted for review along with the plans for the subdivision improvements.

Grading permits for subdivisions can be issued after approval of the plans for the subdivision improvements by the Utility Supervisor, and the items listed above are received.

2. Buildings

Two (2) copies of the sediment and erosion control plan (SECP) shall be submitted to Utility Supervisor along with the building plans.

Grading permits can be issued after approval of the SECP and storm drainage plans by the Utility Supervisor and the items listed above are received.

For sites served by septic systems or other individual on-site wastewater systems, the wastewater systems plans must also be approved prior to issuance of the grading permit.

3. Other Sites

Other sites include borrow and spoil areas, gravel mining areas, and any other sites where a subdivision plat or a building permit is not required.

Two (2) copies of the sediment and erosion control plan (SECP) shall be submitted to the Utility Supervisor for review.

A grading permit can be issued after approval of the SECP by the Utility Supervisor and the items listed above are received.

### **14.3.C. Sediment & Erosion Control Plan (SECP)**

#### **1. Professional Qualifications**

Sediment and Erosion Control plans must be prepared by and bear the seal of an engineer, land surveyor, architect, landscape architect, or geologist registered to practice in the State of Missouri or by a Certified Professional in Erosion and Sediment Control (CPESC) who has attained certification by the Soil & Water Conservation Society. When the total area of the site exceeds one (1) acre, or the drainage area of any watershed for which an element of the plan must be designed exceeds one (1) acre, the plan must be prepared under the supervision of an engineer registered in Missouri.

#### **2. Plan Requirements**

The sediment & erosion control plan must be drawn to scale and must include the following items:

- 1) Location map at a scale of 1" = 2000'.
- 2) Legal description of property.
- 3) North arrow and scale.
- 4) One-Call utility notification symbol.
- 5) Title block.
- 6) Signature block for Utility Supervisor.
- 7) Design professional's seal.
- 8) Existing topographic contours at five feet (5') maximum intervals.

NOTE: Contours cannot be interpolated from U.S.G.S. maps. Each fifth (5<sup>th</sup>) contour (index contour) shall be labeled and shown in heavier line weight. Index contours must be labeled in a sufficient number of locations to allow the plan to be followed. Labels for existing and finish grade contours shall be distinguished by use of different symbols or fonts.

- 9) Proposed grades.
- 10) Existing and proposed utilities.
- 11) Existing ground covering (open areas, tree masses, etc.).
- 12) Existing buildings, drives and pavements.
- 13) Proposed buildings or other structures, drives, and pavements.
- 14) Limits of area to be disturbed (shading preferred).
- 15) Location of erosion and sediment controls.
- 16) Details of non-standard erosion and sediment controls.
- 17) Seeding & mulching requirements.
- 18) Total site area, total disturbed area.
- 19) Location of stockpile areas, staging areas, etc.
- 20) Location of temporary construction entrance.

#### **14.3.D. Bond Requirements**

##### **1. Subdivisions**

A security agreement or other form of security acceptable to the City in the amount of the value of the required sediment and erosion controls, including the storm drainage system, must be received prior to issuance of the grading permit.

##### **2. Buildings**

If the grading permit is issued prior to the building permit, the only type of bond accepted will be a cash bond. After issuance of the building permit, the cash bond can be converted to an escrow, security agreement, or other form of bond allowed in the Zoning Regulations.

##### **3. Other Sites**

Only cash bonds will be accepted for sites where a subdivision plat or building permit is not required. A cash bond is obtained by submitting the required bond amount to the Carterville City Clerk's office in the form of cash, cashier's check or money order, and obtaining a receipt.

##### **4. Amount of Security**

The amount of security will be one thousand dollars (\$1,000.00) per graded acre for seeding and mulching, plus the estimated construction cost for permanent sediment and erosion control measures specified on the SECP. This includes all elements of the storm drainage system.

##### **5. Release of Bond**

Bond will be released one (1) year after seeding and mulching is complete, provided vegetation is firmly established. If vegetation is not firmly established at this time, the bond will be forfeited and the work will be completed under the direction of the City.

Bonds may be released sooner if vegetation is firmly established. Vegetation will be considered firmly established when it has survived from the permanent seeding season in which it is placed to the next permanent seeding season and growth has been established on all eroded areas which have been noted for repair.

#### **14.4 OTHER PERMITS**

##### **A. NPDES Stormwater Permit**

When the area of land disturbance is one (1) acre or more, an application for a stormwater discharge permit must be submitted to the Missouri Department of Natural Resources. Permit requirements are set forth in 10 CSR 20-6.200 of the Missouri Clean Water Laws.

For sites requiring a State permit, the following procedure applies:

1. The sediment and erosion control plan is submitted to the Utility Supervisor.

2. If the plan is in substantial compliance with City requirements, the Utility Supervisor will issue a letter of "Conditional Approval of Stormwater Management Plan". The conditions of approval are the items noted by the Utility Supervisor in the letter as being deficient on the first submittal.
3. The applicant submits MDNR forms E and G, the MDNR fee (with check made payable to "Director of Revenue"), and the Carterville Utility Supervisor's letter of conditional approval to MDNR.
4. MDNR reviews the application.
5. A City permit can be issued upon receipt of a copy of the State permit. Construction can commence only after issuance of the City grading permit.

### City Projects

City-funded projects are covered under general permit MO-R1000. Separate applications are not required for each project.

#### **B. "404" Permit**

Grading activities in streams or wetlands may require a Department of the Army Permit under Section 404 of the Clean Water Act. It is the obligation of the property owner or operator to contact the Corps of Engineers to determine whether a permit is required whenever working in these areas. A copy of the Corps of Engineers written determination, where applicable, shall be provided prior to issuance of the grading permit.

#### **C. Floodplain Development Permit**

A Floodplain Development Permit must be obtained from the City for development within Special Flood Hazard Areas designated on the Flood Insurance Rate Maps for Carterville, Missouri.

#### **D. Industrial Mineral Mines Permit**

Sand and gravel excavation, quarries, and gravel mines must obtain a permit from the Missouri Department of Natural Resources, Land Reclamation Division. Contact the Division of Land Reclamation at P.O. Box 176, Jefferson City, MO 65102 for information concerning these permits.

## **14.5 Design Standards & Criteria**

### **A. Grading**

#### 1. Maximum grades

Cut or fill slopes shall not exceed three (3) horizontal to one (1) vertical (3:1).

#### 2. Maximum height

Cut or fill slopes shall not exceed fifteen feet (15') feet in vertical height unless a horizontal

bench area at least five feet (5') in width is provided for each fifteen feet (15') in vertical height.

3. Minimum slope

Slope in grassed areas shall not be less than one percent (1%).

4. Construction Specifications

Construction of private and public streets must comply with specifications set forth by the City of Carterville.

For all other areas, construction specifications stating requirements for stripping, materials, subgrade compaction, placement of fills, moisture and density control, preparation, and maintenance of subgrade must be included or referenced on the plans or accompanying specifications.

5. Spoil Areas

Broken concrete, asphalt, and other spoil materials may not be buried in fills within proposed building or pavement areas.

Outside of proposed building and pavement areas, broken concrete, asphalt or stone may be buried in fills, provided it is covered by a minimum of two feet (2') of earth.

Burying of other materials in fills is prohibited.

6. Stockpile Areas

Location of proposed stockpile areas shall be outlined on the plans and specifications for proper drainage included.

7. Borrow Areas

The proposed limits of temporary borrow areas shall be outlined in the plans and a proposed operating plan described on the SECP.

At the time borrow operations are completed, the area shall be graded in accordance with the criteria set forth above and vegetation re-established.

**14.5.B. Sediment Control**

1. Existing Vegetative Filter Area

Existing vegetative filter areas may be used where:

- a) unconcentrated sheet flow occurs,
- b) an area of existing vegetation a minimum of twenty-five feet (25') in width can be maintained between the area to be graded and a property line, watercourse, sinkhole, spring, wetland, or waterbody,

- c) existing ground slope is no greater than five to one (5:1) or twenty percent (20%),
- d) the existing vegetative growth is of sufficient density and in sufficiently good condition to provide for filtration of sediment.

The minimum width of the vegetative filter area shall be twenty percent (20%) of the width of the tributary area. Vegetative filter areas can be used as both a temporary and permanent practice.

2. Straw bale dike or silt fence

Containment areas constructed of hay or straw bales or silt fence may be provided in areas where:

- a) unconcentrated sheet flow occurs.
- b) an area of existing vegetation a minimum of twenty-five feet (25') in width cannot be maintained between the area to be graded and a property line, watercourse, sinkhole, spring, wetland, or classified lake.
- c) the maximum width of cleared area upslope of the bale dike or silt fence is as set forth below:

Slope of cleared area (%)	Maximum width upslope of dike/silt fence (feet)
2 to 5	100
5 to 20	50
> 20	25

Either cereal grain straw or hay may be used for bale dikes. Straw bale dikes shall be constructed as shown in Figure 17.

Silt fence may be used in lieu of hay or straw bales. Silt fence shall be constructed as shown in Figure 18.

Straw bale dikes must be installed level, that is, "along the contour", in order to avoid creating points of concentrated overflow. Straw/hay bale dikes and silt fences must be periodically inspected and replaced as necessary if deteriorated.

Hay bale dikes and silt fences are temporary practices.

3. Temporary Containment Berm

Temporary containment berms may be used in lieu of straw bale dikes or silt fence, under the same conditions set forth above. An overflow area six inches (6") below the top of the berm and five feet (5') in length or an approved alternative must be provided for each two hundred feet (200') of berm length. The overflow area shall be lined with six (6) mil or thicker polyethylene plastic, six (6) ounces or heavier non-woven filter fabric, or other approved lining. Plastic and fabric liners shall be held in place by covering the perimeter with earth or weighting down with large rock or sandbags.



Containment berms and swales must be installed level, "along the contour".

Accumulated sediment must be removed when it reaches one-third (1/3) of the berm height.

Temporary containment berms and accumulated sediment must be completely removed after the tributary area is stabilized.

Temporary containment berms shall be constructed as shown in [Figure 19](#).

#### 4. [Inlet Protection](#)

This practice consists of protecting the inlet perimeter or opening with straw bales, silt fence or sandbags. The purpose of this practice is to keep sediment from collecting in storm drains. This practice is also useful when site conditions prevent locating a sediment basin downstream of the storm sewer outfall.

NOTE: Inlet protection described in this paragraph cannot be used where blockage of the inlet opening would result in flooding of residential dwellings, buildings, streets or roads, or off-site property.

##### a. [Curb Inlets](#)

Curb inlets can be protected from sediment entry by placing sand bags over the inlet opening. Sand bags must be replaced when deteriorated and removed when the area has been stabilized. Curb inlet protection is shown in [Figure 20](#).

Accumulated sediment must be removed from the street after each rainfall.

##### b. [Area Inlets](#)

In paved areas, area inlets can be protected by placing gravel filled sandbags up to two (2) courses high around the perimeter of the inlet.

Outside of paved areas or before pavement is placed, area inlets can be protected by installing a silt fence or straw bale dike around the inlet perimeter.

Type DI-1 inlets can be protected by placing sandbags over the openings.

Accumulated sediment must be removed prior to final approval.

Area inlet protection is shown in [Figure 21](#).

#### 5. [Diversion](#)

Where flow must be diverted into sediment basins or other sediment retaining facilities, diversion berms or swales or other approved means of diverting runoff may be specified.

Where sediment enters a street which is up-grade from an existing street, means must be provided to divert runoff to a sediment basin before discharge from the site. The method of diversion will vary depending upon the phase of construction. After initial grading, an earth berm can be used. This is no longer possible after the street subgrade is completed and

curbs are installed. After the street pavement is completed, sand bags can be used to divert the runoff into inlets for discharge into the sediment basin. Diversion of street runoff is shown in Figures 22 and 23.

## 6. Gravel Filter Dam

Where concentrated flow occurs and less than two (2) acres of tributary drainage area are graded (i.e. a sediment basin is not required) or where construction of a sediment basin is not feasible, a gravel filter dam shall be provided prior to discharge of runoff from the property.

Gravel filter dams consist of a layer of filter fabric and crushed rock covering the upstream side of a riprap dike. Riprap shall be six and twelve inches (6" and 12") in size. Filter fabric may be woven or non-woven, Mirafi 500X, Mirafi 150NL, or equal. The purpose of the filter fabric is to remove sediment particles as water flows through it. The layer of crushed rock provides additional filtration protects the filter fabric, and holds it in place.

Where gravel filter dams are used as sediment basin outlets, one (1) square foot of filter fabric area shall be provided for each one thousand (1,000) cubic feet of storage. The minimum area provided shall be four (4) square feet.

Where gravel filter dams are used as ditch checks in channels, the gravel filter area shall extend throughout the width of the dam.

Riprap stilling basins shall be provided downstream of the filter dam where discharge is to a grass channel.

Gravel filter dam details are shown in Figures 24 and 25.

## 7. Sediment Basin

Sediment basins shall be provided for all areas where concentrated flow occurs from an area of two (2) or more acres and vegetative cover has been stripped from more than one (1) acre. Sediment basins shall be designed to detain the first one-half inch (1/2") of runoff from the graded area for a period of at least twenty-four (24) hours (approximately two thousand (2,000) cubic feet per acre graded).

Sediment basins shall have an outflow control structure capable of providing the required detention time. Outflow control structures shall consist of a gravel filter dam meeting the requirements of Section 14.5.2.F, or a perforated riser pipe.

Sediment basins shall also be provided with an overflow structure capable of passing the peak flow rate for storms up to and including the 10% AEP (10-year) storm. The required sediment control volume shall be provided below the elevation of the overflow structure. One foot (1') of freeboard shall be maintained over the 10% AEP high water elevation.

Perforated riser pipes shall have a minimum diameter of eight inches (8") and shall be constructed of schedule 40 or stronger PVC pipe, galvanized corrugated metal pipe, or other approved pipe material. Riser pipes must be provided with a cap. Plans shall specify the height of the riser pipe above the basin floor, the number and spacing of rows of perforations, and the number and diameter of perforations per row. One and one-half inch

(1 ½ ") crushed rock shall be placed around the riser pipes to act as a filter. A typical riser pipe detail is shown in Figure 28.

Outlet pipes shall have a minimum diameter of eight inches (8") and may be constructed of corrugated polyethylene pipe, corrugated metal pipe, Schedule 40 or stronger PVC or reinforced concrete pipe.

Overflow spillways must be constructed of riprap, concrete or other approved, non-erodible material.

Typical sediment basin details are shown in Figures 26, 27 and 28.

Sedimentation basins can be provided as temporary or permanent practices and can also serve as a permanent water quality BMP with appropriate design modifications to meet the criteria set forth in Section 135.

Detention ponds can be used for temporary sediment basins, provided it can be demonstrated that flood control requirements can be met as well as sediment control requirements.

Accumulated sediment must be removed and vegetation established prior to final release of security.

#### **14.5.C. Erosion Protection**

##### **1. Seeding and mulching**

All disturbed areas must be re-vegetated before temporary sediment controls can be removed. Requirements for re-vegetated areas are as follows:

###### **a) Topsoil**

Spreading of topsoil is required for permanent seeding areas only. Topsoil stripped from the site shall be stockpiled for reuse. A minimum of four inches (4") loose depth (before rolling or compacting) of topsoil must be spread on the area to be seeded.

###### **b) Lime**

After topsoil is spread, lime shall be spread at the rate of eight hundred to nine hundred (800 to 900) pounds effective neutralizing material (ENM) per acre.

###### **c) Fertilizer**

Fertilizer shall be 13-13-13, (thirteen (13) pounds each of nitrogen, phosphorus, and potassium per one hundred (100) pounds) and shall be applied at a rate of two hundred to three hundred (200 to 300) pounds per acre.

###### **d) Seed**

Seed mix shall consist of sixty percent to eighty percent (60% to 80%) Kentucky 31 tall fescue and twenty percent to forty percent (20% to 40%) annual ryegrass. Purity shall be at least ninety-seven percent (97%), germination shall be at least eighty-five percent

(85%). Seed mixture shall be applied at a rate of one hundred to one hundred fifty (100 to 150) pounds per acre.

e) Mulch

Type 1 Mulch

Where slopes are less than 4:1, cereal grain mulch is required at the rate of one hundred (100) pounds per one thousand (1,000) square feet (forty-five hundred (4,500) pounds per acre). Cereal grain mulch shall meet the requirements of Section 802 of the Missouri State Specifications for Highway Construction (State specifications) for Type 1 mulch. Mulch may be applied by hand, however it must be evenly spread. It is preferred that mulch be applied with a mechanical blower.

Type 1 mulch must be thoroughly wetted after application.

Type 3 Mulch

Where slopes are 4:1 or greater Type 3 mulch ("hydromulch") meeting the requirements of Section 802 of the State specifications. Type 3 mulch shall be applied at a minimum rate of two thousand (2,000) pounds per acre.

f) Permanent seeding season

Permanent seeding seasons run from March 1 to June 1 and from August 15 to November 1. Where possible, operations shall be scheduled to allow final seeding during these periods. When seeding cannot be completed during these times, areas shall be seeded and mulched upon completion of grading with the amounts of lime, fertilizer, seed, and mulch specified above, regardless of the season. Any areas where growth has not been established shall be re-seeded during the next seeding season.

g) Temporary seeding

Temporary seeding shall be applied to lot areas, building areas and other areas planned to receive other permanent coverings. Spreading of topsoil is not required in temporary seeding areas. Lime, fertilizer, seed, and mulch shall be applied at the rates specified above.

h) Maintenance

Areas seeded between March 1 - June 1 or between August 15 - November 1 must be maintained until growth is firmly established as set forth in Section 14.3.4.E.

i) Other specifications

Other seeding and mulching specifications may be used with the written approval of the Utility Supervisor.

2. Cut and Fill Slopes

Cut and fill slopes shall be protected from erosion by construction of straw bale dikes, silt

fences, diversion berms, or swales along the top of the slope.

Where drainage must be carried down the slopes, pipe drains, concrete flumes, riprap chutes, or other impervious areas must be provided. Suitable erosion control measures such as riprap stilling basins, must be provided at the bottom of the slope.

Diversions shall be maintained until permanent growth is firmly established on the slopes.

Typical diversion details are shown in [Figure 29](#). Riprap chute details are shown in [Figure 30](#).

### 3. [Channels and Swales](#).

Permanent channels and swales shall be provided with a stabilized invert, as provided in [Section 8](#).

### 4. [Storm Sewer and Culvert Outlets](#)

Erosion protection shall be provided at storm sewer and culvert outlets as provided in [Section 7](#).

### 5. [Ditch Checks](#)

Straw bale ditch checks have proven to be generally ineffective due to improper installation and inability of bales to withstand the force of concentrated flow of water. Ditches, channels, and swales should be stabilized as soon as possible after grading by lining with erosion control blanket, sod, or installing permanent linings as described in [Section 8](#).

Where ditches, channels, or swales cannot be stabilized within thirty (30) days after grading, rock check dams or sand bag check dams must be provided. Rock check dams may be used in ditches with a design water depth of up to two feet (2') for the 2-year storm. Sand bag check dams may be used in ditches with a design water depth of up to one foot (1') for the 2-year storm.

Rock check dams are shown in [Figure 31](#). Sand bag check dams are shown in [Figure 32](#).

## **14.5.D. Temporary Construction Entrance**

A minimum of one (1) temporary construction entrance is required at each site. Additional temporary entrances may be provided if approved. The location of each construction entrance shall be shown on the SECP.

Only construction entrances designated on the sediment and erosion control plan may be used. Barricades shall be maintained if necessary to prevent access at other points until construction is complete.

Construction entrances shall be constructed of one and one-half inches (1 ½") clean crushed limestone and shall be a minimum of twenty-five feet (25') wide and fifty (50') feet long. Minimum thickness of crushed limestone surface shall be six inches (6"). Additional two inch (2") lifts of crushed limestone shall be added at the discretion of the City if the surface of the initial drive deteriorates or becomes too muddy to be effective.

In locations where an existing drive or street extends at least fifty feet (50') into the site, the existing drive may be designated as the construction entrance, and construction of a new gravel entrance is not required, unless job conditions warrant.

A permit must be obtained from the City of Carterville for temporary construction entrances on City roads. A permit must be obtained from the Missouri Department of Transportation (MODOT) whenever the entrance is located on State right-of-way.

**14.5.E. Cleaning Streets**

Streets, both interior and adjacent to the site, shall be cleaned of sediment after each rainfall of one-half inch (½") or more and at the end of construction and prior to release of escrow.

**14.5.F. Dust Control**

The contractor will be required to use water trucks to wet haul roads and construction areas to minimize dust leaving the site when conditions warrant.

**14.5.G. Sequencing and Scheduling**

Costs of sediment and erosion control can be minimized if proper consideration is given to sequencing and scheduling construction.

Any special sequencing and scheduling considerations must be noted on the SECP. The contractor must provide a sequence of construction activities as a part of the SWPPP.

\* \* \* \* \*

Rainfall Intensity-Duration-Frequency, Joplin, Missouri						
Duration Hr:Min	Annual Probability, Percent					
	1	2	4	10	20	50
	Rainfall Intensity, Inches per Hour					
00:05	10.20	9.30	8.41	7.25	6.47	5.39
00:06	9.82	8.97	8.09	7.01	6.23	5.19
00:07	9.48	8.68	7.79	6.75	6.00	5.02
00:08	9.16	8.35	7.49	6.51	5.79	4.84
00:09	8.83	8.07	7.26	6.28	5.59	4.66
00:10	8.53	7.79	7.03	6.06	5.40	4.51
00:11	8.24	7.52	6.77	5.86	5.22	4.35
00:12	7.97	7.26	6.55	5.66	5.05	4.22
00:13	7.71	7.03	6.36	5.49	4.90	4.08
00:14	7.48	6.82	6.16	5.32	4.75	3.96
00:15	7.27	6.63	5.96	5.16	4.61	3.83
00:16	7.10	6.49	5.86	5.05	4.49	3.73
00:17	6.96	6.34	5.72	4.92	4.37	3.64
00:18	6.82	6.23	5.61	4.84	4.29	3.54
00:19	6.72	6.14	5.51	4.74	4.20	3.46
00:20	6.62	6.04	5.40	4.67	4.11	3.38
00:21	6.52	5.96	5.31	4.59	4.04	3.30
00:22	6.44	5.87	5.23	4.52	3.97	3.22
00:23	6.36	5.79	5.16	4.48	3.92	3.15
00:24	6.28	5.74	5.09	4.41	3.84	3.09
00:25	6.20	5.66	5.00	4.35	3.79	3.01
00:26	6.14	5.61	4.95	4.31	3.73	2.95
00:27	6.07	5.54	4.89	4.25	3.68	2.91
00:28	5.99	5.49	4.82	4.21	3.62	2.84
00:29	5.94	5.41	4.77	4.16	3.57	2.79
00:30	5.88	5.37	4.72	4.10	3.52	2.74
00:35	5.54	5.08	4.42	3.88	3.29	2.51
00:40	5.22	4.78	4.14	3.64	3.08	2.32
00:45	4.91	4.50	3.89	3.42	2.86	2.13
00:50	4.61	4.20	3.64	3.20	2.67	1.99
00:55	4.32	3.95	3.42	3.00	2.52	1.86
01:00	4.11	3.75	3.25	2.86	2.38	1.80



*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

RAINFALL DATA TABLE  
INTENSITY-DURATION-FREQUENCY

TABLE A

Rainfall Depth-Duration-Frequency, Joplin, Missouri						
Duration Hr:Min	Annual Probability, Percent					
	1	2	4	10	20	50
	Rainfall Depth, Inches					
1:00	4.10	3.73	3.27	2.87	2.40	1.80
1:15	4.42	4.00	3.48	3.01	2.50	1.91
1:30	4.68	4.22	3.70	3.19	2.60	2.00
1:45	4.87	4.39	3.87	3.32	2.70	2.10
2:00	5.01	4.55	4.06	3.45	2.82	2.19
2:15	5.21	4.69	4.20	3.55	2.92	2.29
2:30	5.32	4.82	4.33	3.67	3.04	2.38
2:45	5.46	4.95	4.45	3.77	3.14	2.47
3:00	5.54	5.05	4.56	3.85	3.26	2.54
3:30	5.73	5.25	4.69	3.98	3.41	2.66
4:00	5.88	5.44	4.80	4.06	3.51	2.74
4:30	6.04	5.62	4.87	4.13	3.61	2.79
5:00	6.19	5.79	4.94	4.20	3.69	2.85
5:30	6.32	5.92	4.99	4.25	3.75	2.87
6:00	6.45	6.06	5.04	4.30	3.79	2.91
7:00	6.72	6.27	5.18	4.41	3.90	2.96
8:00	6.99	6.44	5.35	4.53	4.02	3.02
9:00	7.28	6.61	5.53	4.66	4.11	3.12
10:00	7.55	6.75	5.70	4.80	4.20	3.17
11:00	7.79	6.87	5.88	4.94	4.27	3.23
12:00	8.01	7.02	6.03	5.05	4.35	3.30
15:00	8.44	7.31	6.40	5.35	4.55	3.48
18:00	8.74	7.60	6.66	5.60	4.72	3.65
21:00	8.96	7.86	6.90	5.82	4.88	3.82
24:00	9.08	8.05	7.06	6.01	5.01	3.96

Source: Bulletin 71, Rainfall Frequency Atlas of the Midwest, Huff and Angel, 1992  
National Weather Service Hydro 35, Five- to 60-Minute Precipitation Frequency for the  
Eastern and Central United States, 1977.



*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

RAINFALL DATA TABLE  
DEPTH-DURATION-FREQUENCY

TABLE A, Continued



Huff's Median Time Distributions of Heavy Storm Rainfall. Cumulative storm rainfall (%) versus cumulative storm time (%). Source: *Rainfall Frequency Atlas of the Midwest*, F.A. Huff and J. R. Angel, Midwestern Climate Center, 1992.

Cum % of storm time	Point Rainfall				Cum % of storm time	10 to 50 Square Miles				Cum % of storm time	50 to 400 Square Miles				Cum % of storm time
	Quartile					Quartile					Quartile				
	1st	2nd	3rd	4th		1st	2nd	3rd	4th		1st	2nd	3rd	4th	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	16	3	3	2	5	12	3	2	2	5	8	2	2	2	5
10	33	8	6	5	10	25	6	5	4	10	17	4	4	3	10
15	43	12	9	8	15	38	10	8	7	15	34	8	7	5	15
20	52	16	12	10	20	51	14	12	9	20	50	12	10	7	20
25	60	22	15	13	25	62	21	14	11	25	63	21	12	9	25
30	66	29	19	16	30	69	30	17	13	30	71	31	14	10	30
35	71	39	23	19	35	74	40	20	15	35	76	42	16	12	35
40	75	51	27	22	40	78	52	23	18	40	80	53	19	14	40
45	79	62	32	25	45	81	63	27	21	45	83	64	22	16	45
50	82	70	38	28	50	84	72	33	24	50	86	73	29	19	50
55	84	76	45	32	55	86	78	42	27	55	88	80	39	21	55
60	86	81	57	35	60	88	83	55	30	60	90	86	54	25	60
65	88	85	70	39	65	90	87	69	34	65	92	89	68	29	65
70	90	88	79	45	70	92	90	79	40	70	93	92	79	35	70
75	92	91	85	51	75	94	92	86	47	75	95	94	87	43	75
80	94	93	89	59	80	95	94	91	57	80	96	96	92	54	80
85	96	95	92	72	85	96	96	94	74	85	97	97	95	75	85
90	97	97	95	84	90	97	97	96	88	90	98	98	97	92	90
95	98	98	97	92	95	98	98	98	95	95	99	99	99	97	95
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100



*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

HUFF'S QUARTILE  
RAINFALL DISTRIBUTIONS

TABLE B

### SURFACE RUNOFF COEFFICIENTS

<u>LAND USE</u>	<u>PROPORTIONAL SURFACE CONDITION</u>		<u>RATIONAL METHOD "C"</u>
	<u>IMPERV.</u>	<u>TURF OR =</u>	
Residential Low-Medium Density (Single Family & Duplex)	0.35	0.65	0.44
Residential Medium-high Density (6 or fewer D.U. per bldg. and mobile home parks)	0.60	0.40	0.62
Residential High Density (Over 6 D.U. per bldg.)	0.80	0.20	0.76
Public/Semi-Public (Schools, Gov't., Institutional)	0.65	0.35	0.66
Commercial/Industrial; Office Parks	0.70	0.30	0.69
Neighborhood Commercial	0.85	0.15	0.80
General Commercial (Shopping Centers)	0.95	0.05	0.87
Central Business District	1.00	0.00	0.90
Industrial	0.80	0.20	0.76
Open Space, Parks, Golf Courses	0.10	0.90	0.27
Agricultural/Cultivated	0.05	0.95	0.24
All Land Uses: 100 % Impervious Surfaces			0.90
100 % Pervious Surfaces (With maintained turf cover or =)			0.20

Ref: SCS, APWA (3/90)



*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

SURFACE RUNOFF  
COEFFICIENTS

TABLE C

Runoff Curve Numbers (Average Watershed Conditions,  $I_a = 0.2S$ )

Land Use Description	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
Fully developed urban areas <sup>a</sup> (vegetation established)				
Lawns, open spaces, parks, golf courses, cemeteries, etc.				
Good condition; grass cover on 75% or more of the area	39	61	74	80
Fair condition; grass cover on 50% to 75% of the area	49	69	79	84
Poor condition; grass cover on 50% or less the area	68	79	86	89
Paved parking lots, roofs, driveways, etc.	98	98	98	98
Streets and roads				
Paved with curbs and storm sewers	98	98	98	98
Gravel	76	85	89	91
Dirt	72	82	87	89
Paved with open ditches	83	89	92	93
	Average % Impervious <sup>b</sup>			
Industrial, commercial and business areas	85	89	92	94
	80	86	91	94
	75	83	89	93.5
	70	80	87	92.7
Row houses, town houses, and residential with lot sizes 1/8 acre or less	65	77	85	90
Residential: average lot size				
1/4 acre	38	61	75	83
	30	57	72	81
	25	54	70	80
	20	51	68	79
	12	46	65	77
Developing urban areas <sup>c</sup> (no vegetation established)				
Newly graded area	77	86	91	94



Runoff Curve Numbers

Land Use Description	Hydrologic Condition	Curve Numbers for Hydrologic Soil Group			
		A	B	C	D
Meadow	-	30	58	71	78
Forestland-grass or orchards -evergreen or Deciduous	Poor	55	73	82	86
	Fair	44	65	76	82
	Good	32	58	72	79
Brush	Poor	48	67	77	83
	Good	20	48	65	73
Woods	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Farmsteads	-	59	74	82	86
Forest-Range					
Herbaceous	Poor	-	79	86	92
	Fair	-	71	80	89
	Good		61	74	84

Land use	Treatment of Practice	Hydrologic Condition	A	B	C	D
Cultivated agricultural land						
Fallow	Straight row	-	77	86	91	94
	Conservation tillage	Poor	76	85	90	93
	Conservation tillage	Good	74	83	88	90
Row crops	Straight row	Poor	72	81	88	91
	Straight row	Good	67	78	85	89
	Conservation tillage	Poor	71	80	87	90
	Conservation tillage	Good	64	75	82	85



Land use	Treatment of Practice	Hydrologic Condition	A	B	C	D
Row crops	Contoured	Poor	70	79	84	88
	Contoured	Good	65	75	82	86
	Contoured and conservation tillage	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured and terraces	Poor	66	74	80	82
	Contoured and terraces	Good	62	71	78	81
	Contoured and terraces and conservation tillage	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	Straight row	Poor	65	76	84	88
	Straight row	Good	63	75	83	87
	Conservation tillage	Poor	64	75	83	86
	Conservation tillage	Good	60	72	80	84
	Contoured	Poor	63	74	82	85
	Contoured	Good	61	73	81	84
	Contoured and conservation tillage	Poor	62	73	81	84
		Good	60	72	80	83
	Contoured and terraces	Poor	61	72	79	82
	Contoured and terraces	Good	59	70	78	81
	Contoured and terraces and conservation tillage	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded legumes or rotation meadow <sup>c</sup>	Straight row	Poor	66	77	85	89
	Straight row	Good	58	72	81	85
rotation meadow <sup>c</sup>	Contoured	Poor	64	75	83	85
	Contoured	Good	55	69	78	83
	Contoured and terraces	Poor	63	73	80	83
	Contoured and terraces	Good	51	67	76	80





Land use	Treatment of Practice	Hydrologic Condition	A	B	C	D
Noncultivated	No mechanical treatment	Poor	68	79	86	89
agricultural land	No mechanical treatment	Fair	49	69	79	84
pasture or range	No mechanical treatment	Good	39	61	74	80
	Contoured	Poor	47	67	81	88
	Contoured	Fair	25	59	75	83
	Contoured	Good	6	35	70	79

<sup>a</sup> For land uses with impervious areas, curve numbers are computed assuming that 100% of runoff from impervious areas is directly connected to the drainage system. Pervious areas (lawn) are considered to be equivalent to lawns in good condition and the impervious areas have a *CN* of 98.

<sup>b</sup> Includes paved streets.

<sup>c</sup> Use for the design of temporary measures during grading and construction. Impervious area percent for urban areas under development vary considerably. The user will determine the percent impervious. Then using the newly graded area *CN* and Figure 8.7.1a or b, the composite *CN* can be computed for any degree of development.

<sup>d</sup> For conservation tillage poor hydrologic condition, 5% to 20% of the surface is covered with residue (less than 750-lb/acre row crops or 300-lb/acre small grain).

For conservation tillage good hydrologic condition, more than 20% of the surface is covered with residue (greater than 750-lb/acre row crops or 300-lb/acre small grain).

<sup>e</sup> Close-drilled or broadcast.

For noncultivated agricultural land:

Poor hydrologic condition has less than 25% ground cover density.

Fair hydrologic condition has between 25% and 50% ground cover density.

Good hydrologic condition has more than 50% ground cover density.

For forest-range:

Poor hydrologic condition has less than 30% ground cover density.

Fair hydrologic condition has between 30% and 70% ground cover density.

Good hydrologic condition has more than 70% ground cover density.

Source: U.S. Department of Agriculture Soil Conservation Service (1986).



**MANNING'S ROUGHNESS COEFFICIENTS ("n")**

<u><b>TYPE OF CHANNEL</b></u>	<u><b>n</b></u>
<b>Closed Conduits</b>	
Reinforced Concrete Pipe .....	0.013
Reinforced Concrete Elliptical Pipe .....	0.013
Corrugated Metal Pipe:	
2-2/3 x 1/2 in Annular Corrugations unpaved - plain .....	0.024
2-2/3 x 1/2 in Annular Corrugations paved invert .....	0.021
3 x 1 in Annular Corrugations unpaved - plain .....	0.027
3 x 1 in Annular Corrugations paved invert .....	0.023
6 x 2 in Corrugations unpaved - plain .....	0.033
6 x 2 Corrugations paved invert .....	0.028
Vitrified Clay Pipe .....	0.013
Asbestos Cement Pipe .....	0.012
<b>Open Channels (Lined)</b>	
Gabions .....	0.025
Concrete	
Trowel Finish .....	0.013
Float Finish .....	0.015
Unfinished .....	0.017
Concrete, bottom float finished, with sides of	
Dressed Stone .....	0.017
Random Stone .....	0.020
Cement Rubble Masonry .....	0.025
Dry Rubble or Riprap .....	0.030
Gravel bottom, side of	
Random Stone .....	0.023
Riprap .....	0.030
Grass (Sod) .....	0.035
<b>Open Channels (Unlimited) Excavated or Dredged</b>	
Earth, straight and uniform .....	0.027
Earth, winding and sluggish .....	0.035
<b>Natural Stream</b>	
Clean stream, straight .....	0.030
Stream with pools, sluggish reaches, heavy underbrush .....	0.100
Flood Plains	
Grass, no brush .....	0.030
With some brush .....	0.090
Street Curbing .....	0.014

Ref: APWA (3/90)



## HEAD LOSS COEFFICIENTS (k) FOR HYDRAULIC CALCULATIONS

<u>CONDITIONS</u>	<u>k</u>
Manhole, junction boxes and inlets with shaped inverts:	
Thru Flow .....	0.15
Junction .....	0.4
Contraction Transition .....	0.1
Expansion Transition .....	0.2
90 degree bend .....	0.4
45 degree and less bends .....	0.3
Culvert outlet .....	1.0
Culvert inlets:	
Pipe, Concrete	
Projecting from fill, socket end (grooved end) .....	0.2
Projecting from fill, sq cut end .....	0.5
Headwall or headwall and wingwalls	
Socket end of pipe (grooved end) .....	0.2
Square edge .....	0.5
Round (radius = 1/12D) .....	0.2
Mitered to conform to fill slope .....	0.7
Standard end section .....	0.5
Beveled edges, 33.7° or 45° bevels .....	0.2
Side-or-slope-tapered inlet .....	0.2
Pipe, or Pipe-Arch, corrugated Metal	
Projecting from fill (not headwall) .....	0.9
Headwall or headwall and wingwalls square edge .....	0.5
Mitered to conform to fill slope, paved or unpaved slope .....	0.7
Standard end section .....	0.5
Beveled edges, 33.7° or 45° bevels .....	0.2
Side-or-slope-tapered inlet .....	0.2
Box Reinforced Concrete	
Headwall parallel to embankment (no wingwalls)	
Square edge on 3 edges .....	0.5
Rounded on 3 edges to radius of 1/12 barrel dimension, or beveled edges on 3 sides .....	0.2
Wingwalls at 30° to 75° to barrel	
Square edged at crown .....	0.4
Crown edge rounded to radius of 1/12 barrel dimension, or beveled top edge .....	0.20
Wingwall at 10° to 25° to barrel	
Square edged at crown .....	0.5
Wingwalls parallel (extension of sides)	
Square edged at crown .....	0.7
Side-or-slope-tapered inlet .....	0.2

Ref: APWA (3/90)





**CURB OPENING INLETS CAPACITY INSTALLED ON SLOPING GUTTERS**

FLOW DEPTH @ CURB (FEET)	INLET INTERCEPTION CAPACITY IN CUBIC FEET PER SECOND (CFS)								
	INLET OPENING LENGTH IN FEET								
	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
0.05	0.14	0.17	0.20	0.22	0.24	0.25	0.27	0.28	0.28
0.10	0.33	0.41	0.48	0.54	0.60	0.66	0.71	0.77	0.81
0.15	0.55	0.67	0.79	0.91	1.02	1.13	1.23	1.33	1.43
0.20	0.78	0.96	1.14	1.31	1.48	1.65	1.81	1.96	2.11
0.25	1.03	1.27	1.51	1.75	1.98	2.20	2.42	2.64	2.85
0.30	1.29	1.60	1.91	2.21	2.51	2.80	3.09	3.37	3.65
0.35	1.58	1.96	2.33	2.70	3.07	3.43	3.79	4.14	4.49
0.40	1.87	2.33	2.78	3.22	3.66	4.10	4.53	4.95	5.37
0.45	2.18	2.72	3.24	3.77	4.29	4.80	5.31	5.81	6.31
0.50	2.51	3.12	3.73	4.34	4.93	5.53	6.12	6.70	7.28
0.55	2.85	3.55	4.24	4.93	5.61	6.29	6.96	7.63	8.29
0.60	3.20	3.98	4.76	5.54	6.31	7.07	7.83	8.59	9.34

**INSTALLATION CRITERIA:**

- Gutter Depression At Inlet = 4.0" (Minimum)
- Clear Height Of Opening = 6.0" (Minimum)
- Capacity Reduction For Clogging = 20 %

Ref: MoDOT

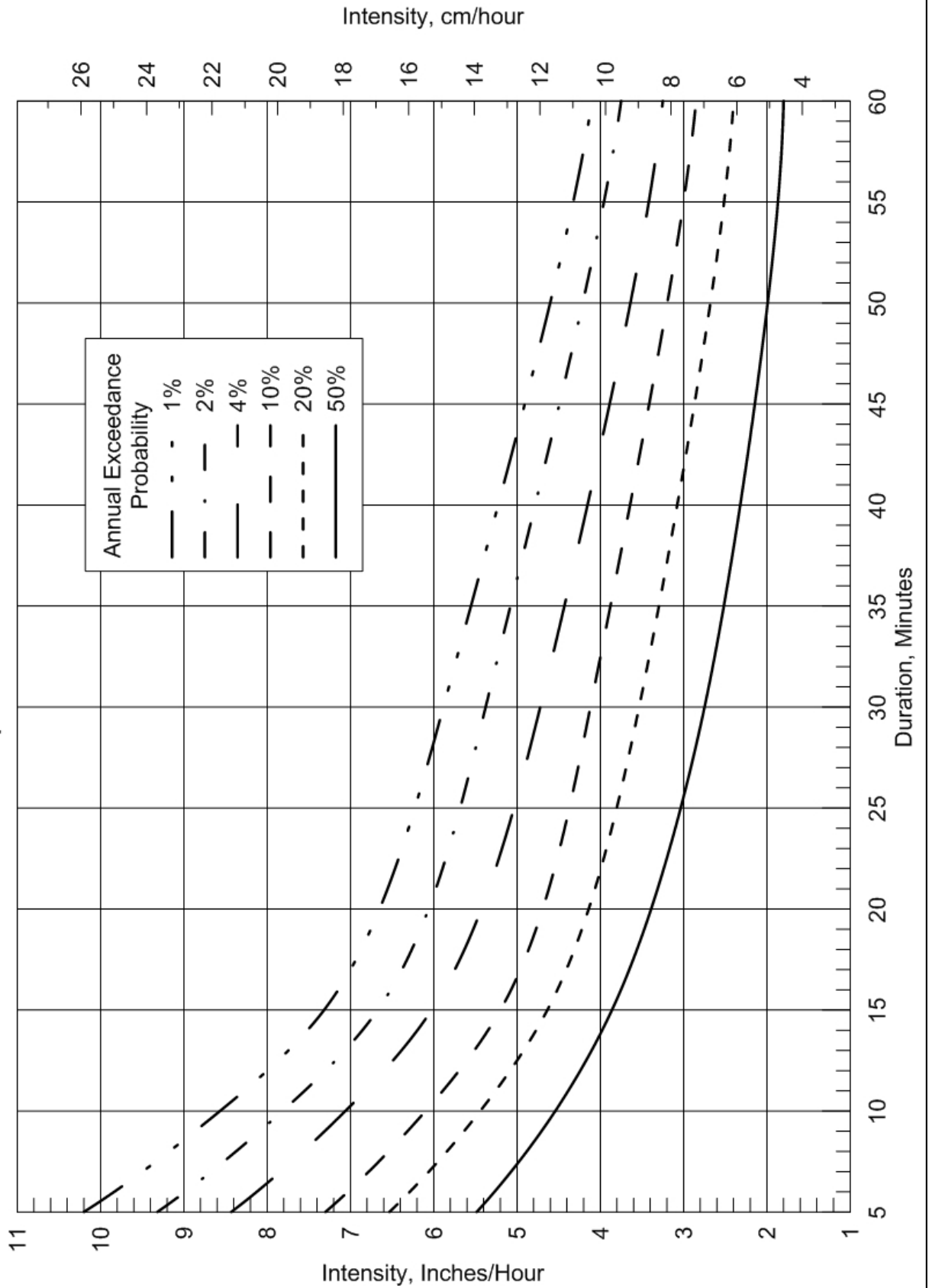


*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

CURB OPENING INLETS  
CAPACITY ON GRADE

TABLE H

# Rainfall Intensity-Duration-Frequency Carterville, Missouri

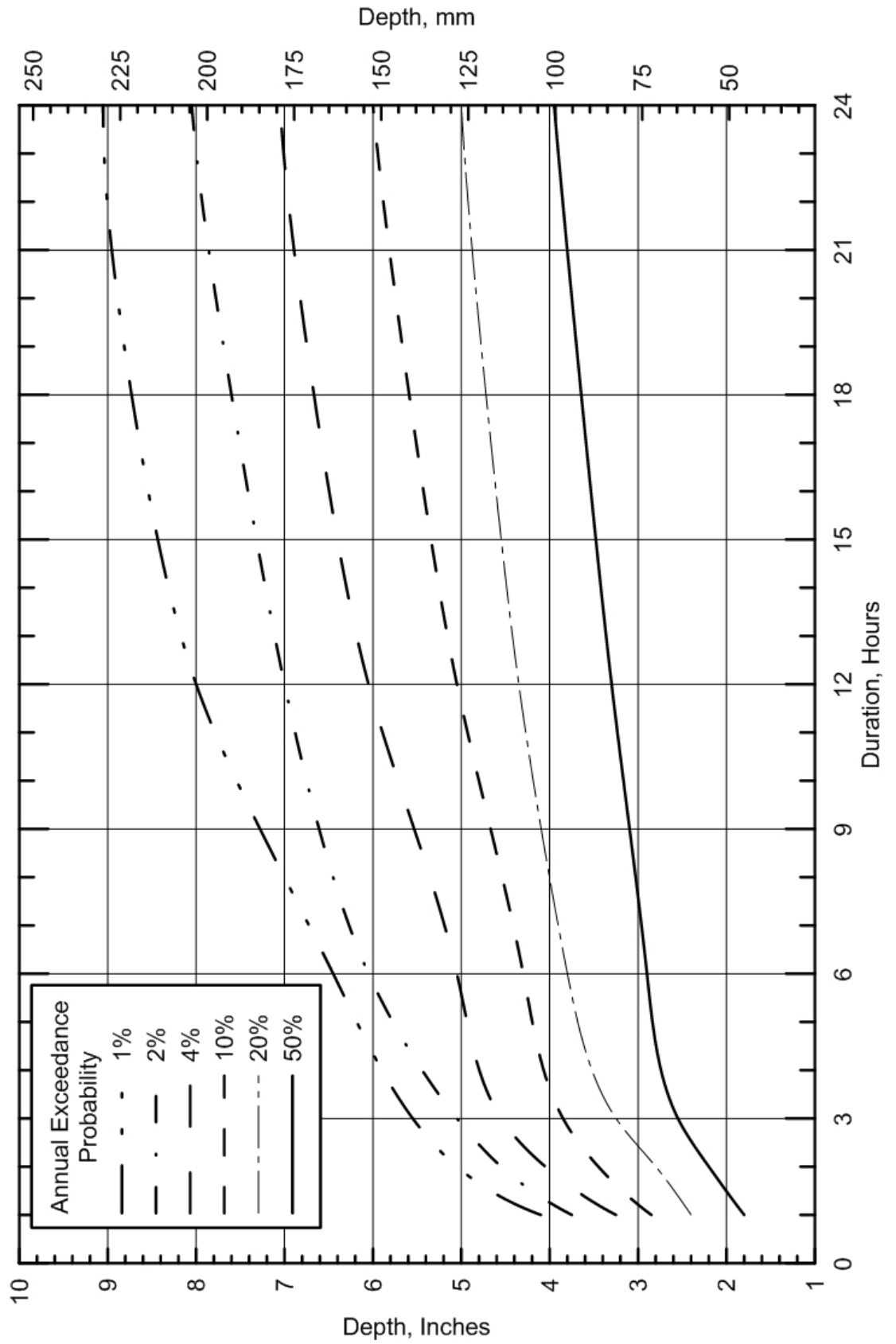


*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

RAINFALL  
IDF CURVES

FIGURE 1

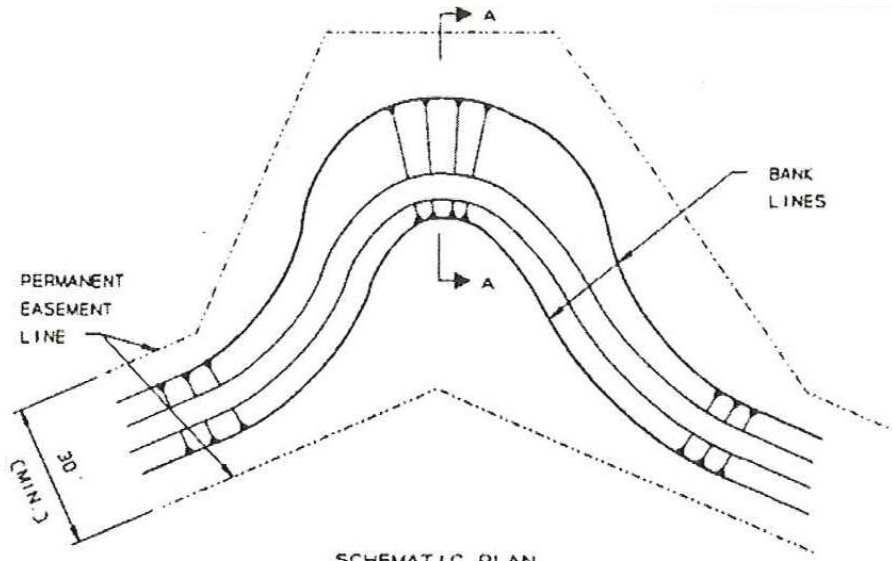
# Rainfall Depth-Duration-Frequency Cartersville, Missouri



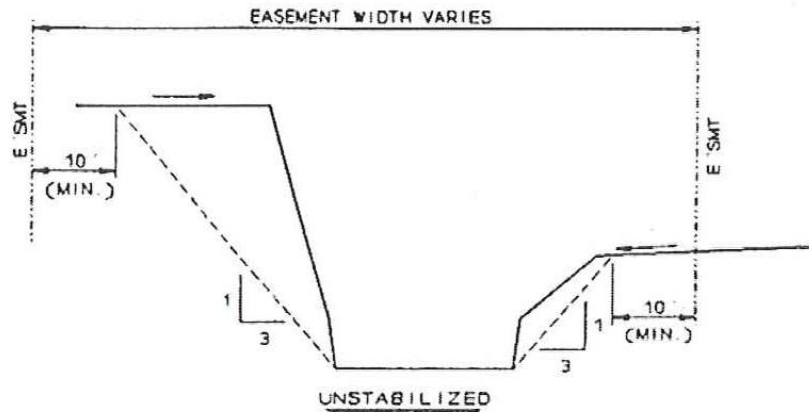
*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

RAINFALL  
DDF CURVES

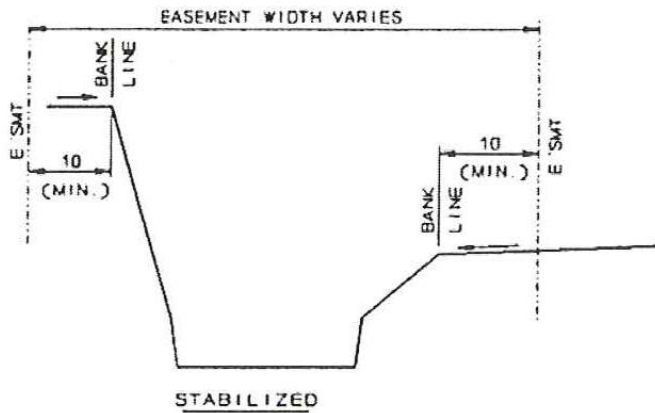
FIGURE 2



**SCHMATIC PLAN**  
NOT TO SCALE



**UNSTABILIZED**



**STABILIZED**

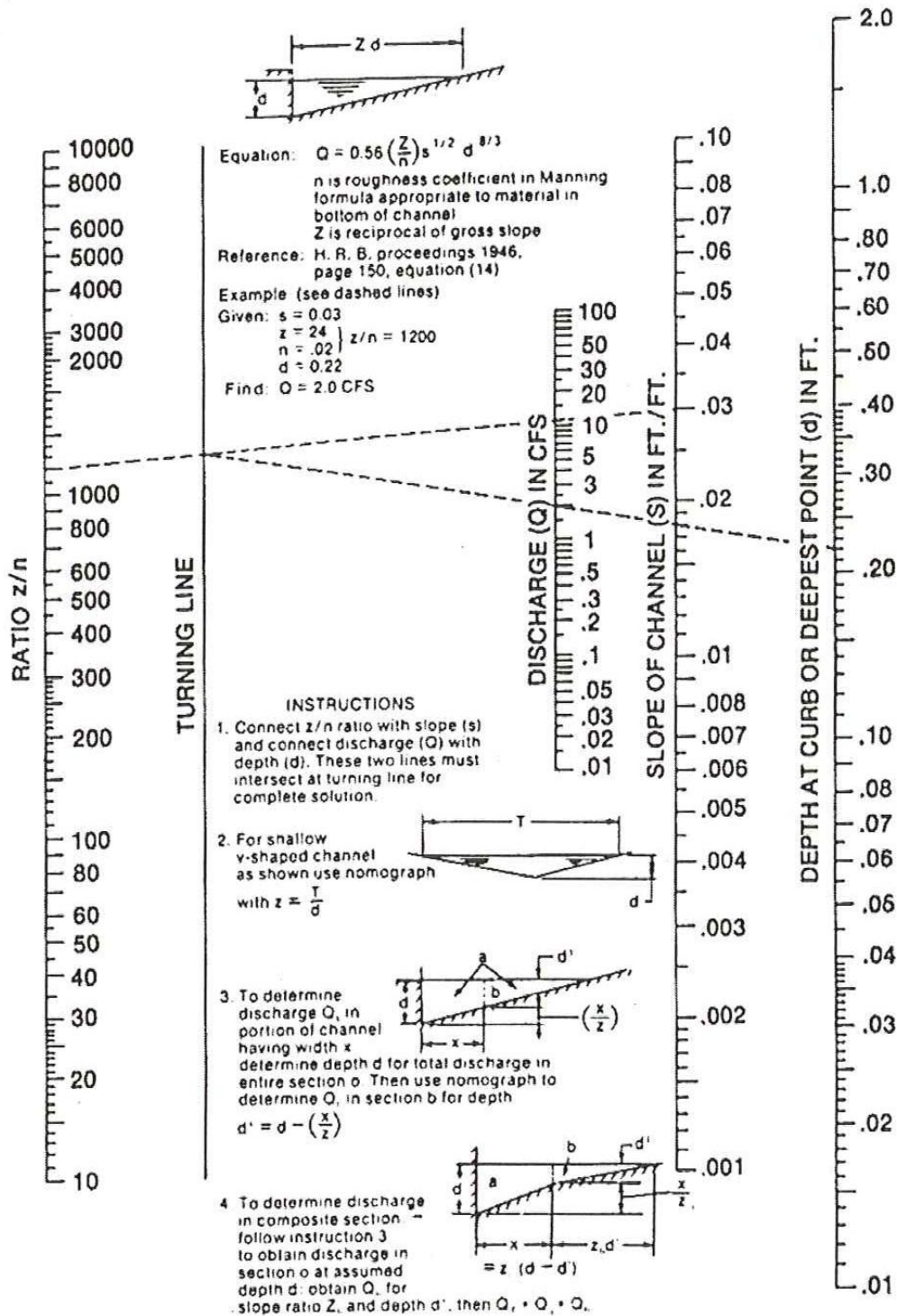
**SECTION A**  
NOT TO SCALE



*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

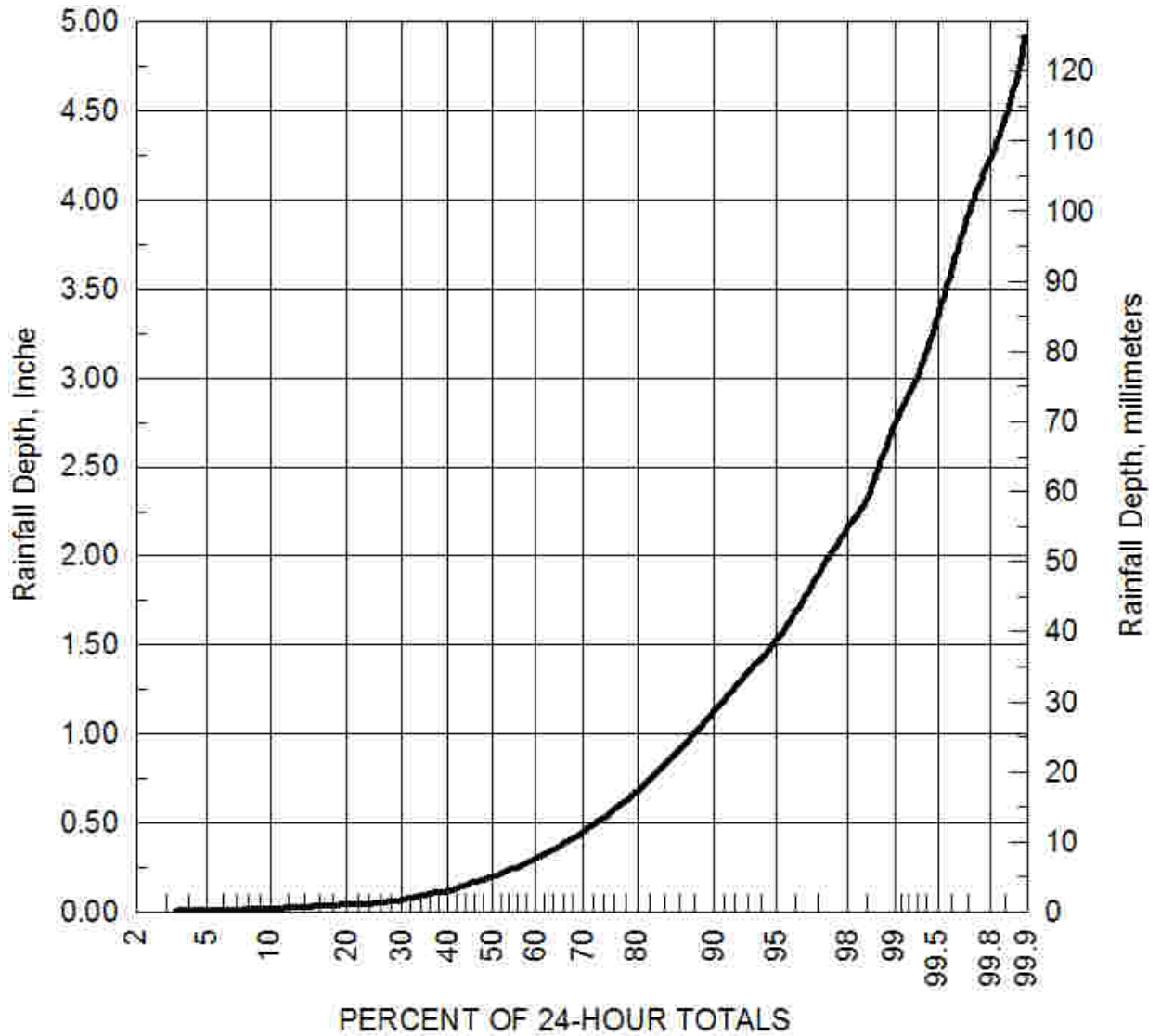
PERMANENT EASEMENT  
CHANNELS

FIGURE 3



Ref: APWA (3/90)





NATIONAL WEATHER SERVICE, HOURLY PRECIPITATION, JOPLIN, MISSOURI  
 PERIOD OF RECORD July 1, 1948— December 31, 2006

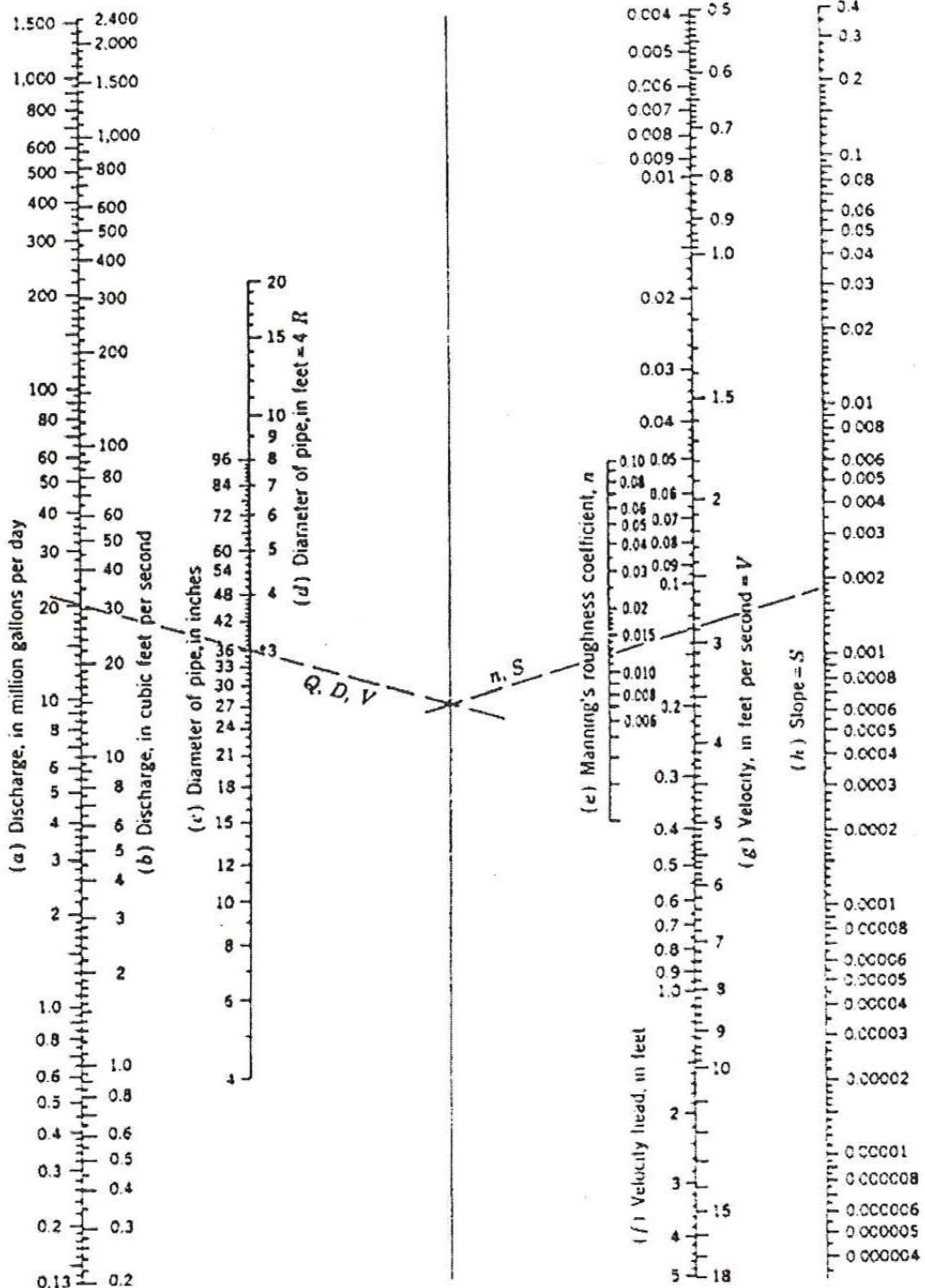


*City of Carterville, Missouri*  
 STORMWATER MANAGEMENT CRITERIA

RAINFALL  
 24-HOUR TOTALS

FIGURE 5





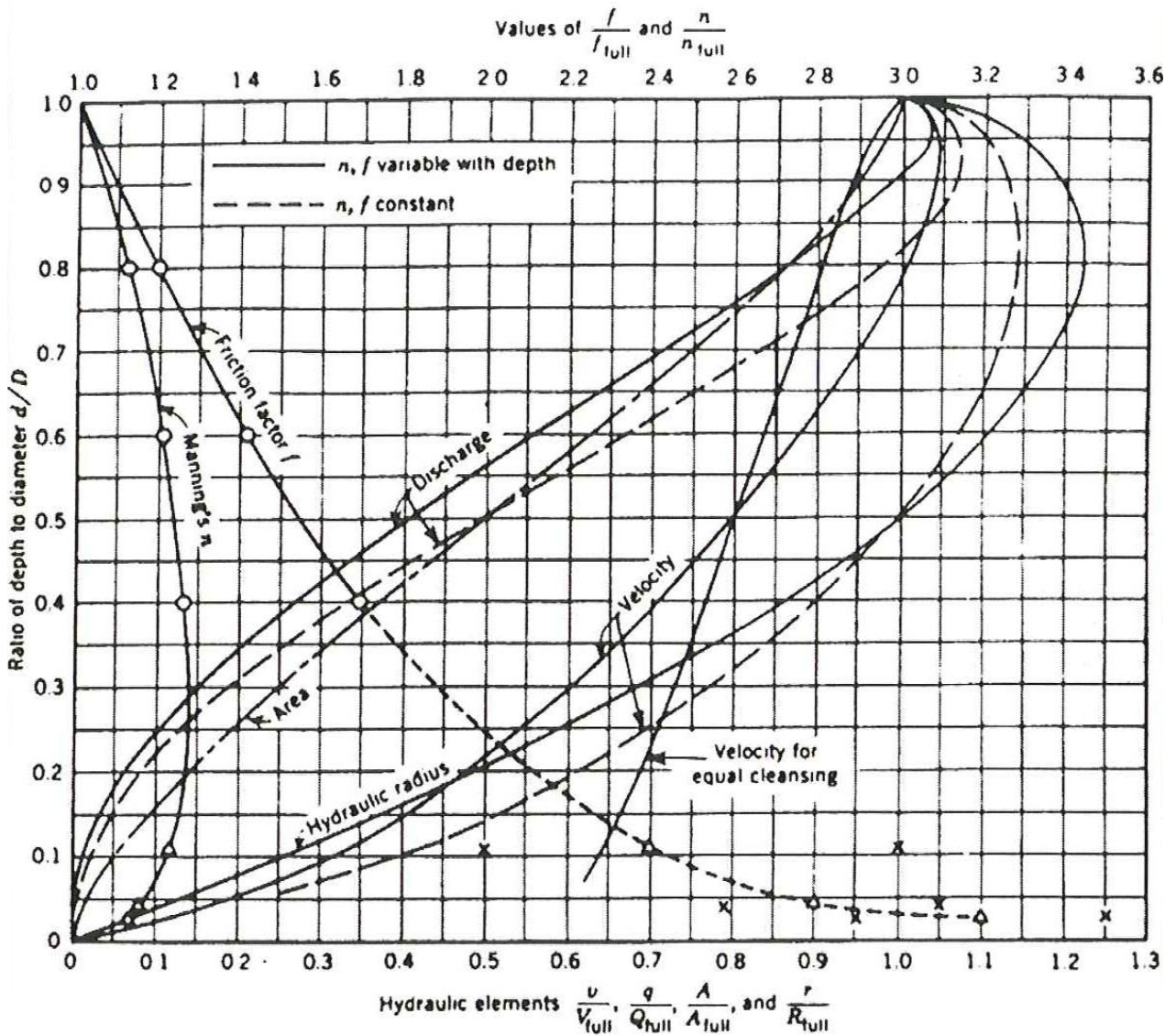
Ref: APWA (3/90)



*City of Carterville, Missouri*  
 STORMWATER MANAGEMENT CRITERIA

FLOW IN PIPES  
 MANNING'S FORMULA

FIGURE 7



- |  |  |
|--|--|
| $v$ = Actual velocity of flow (fps)      | $A$ = Area occupied by flow (ft. <sup>2</sup> )  |
| $V_{full}$ = Velocity flowing full (fps) | $A_{full}$ = Area of pipe (ft. <sup>2</sup> )    |
| $q$ = Actual quantity of flow (cfs)      | $r$ = Actual hydraulic radius (ft.)              |
| $Q_{full}$ = Capacity flowing full (cfs) | $R_{full}$ = Hydraulic radius of full pipe (ft.) |

Ref: APWA (3/90)

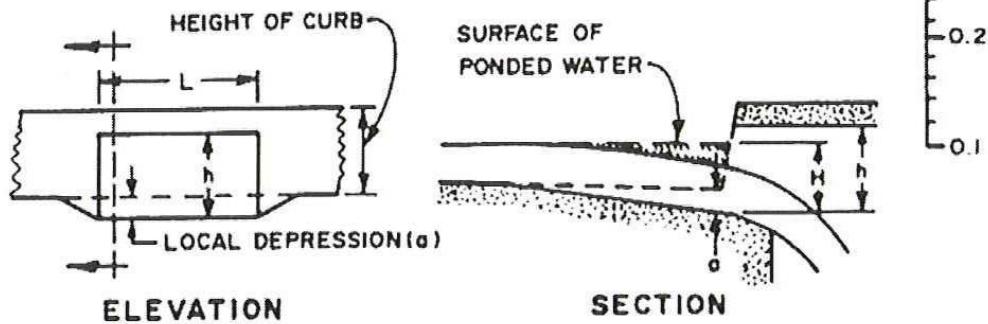
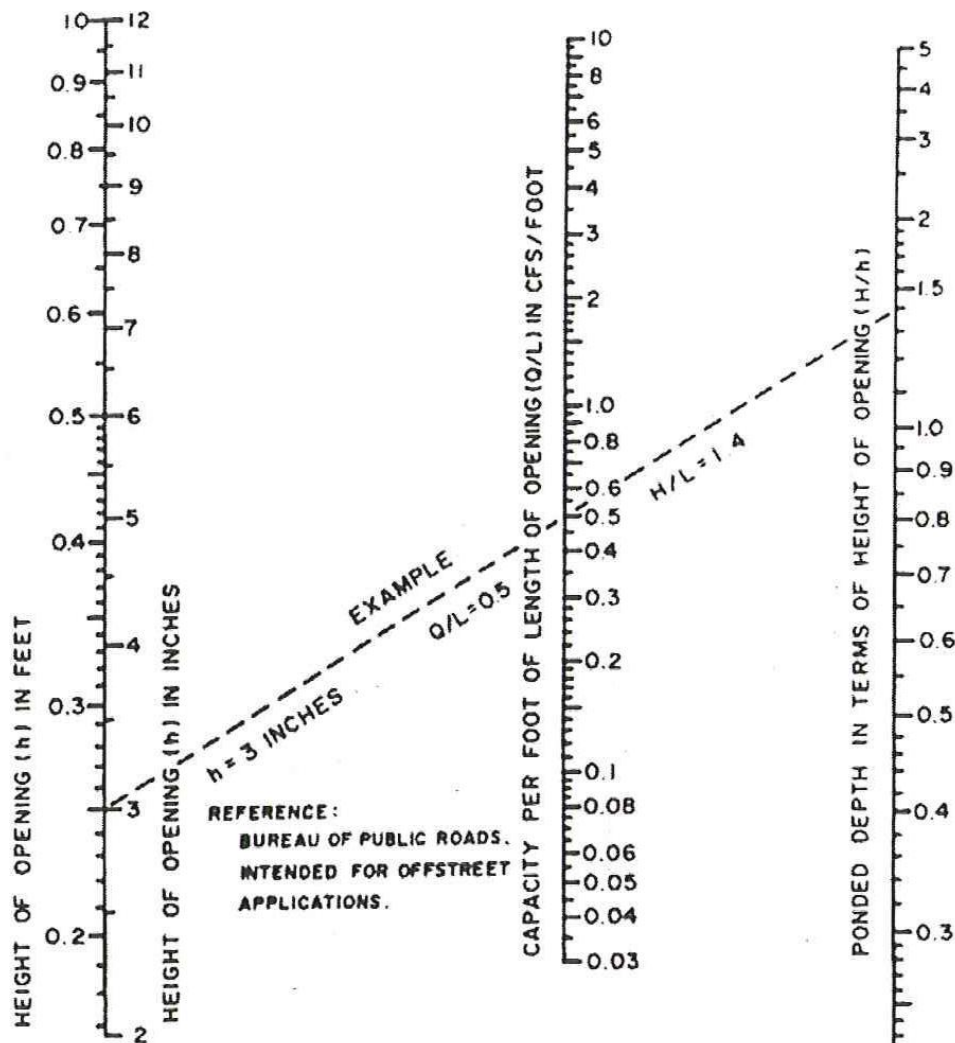


*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

HYDRAULIC ELEMENTS  
CIRCULAR CONDUIT

FIGURE 8





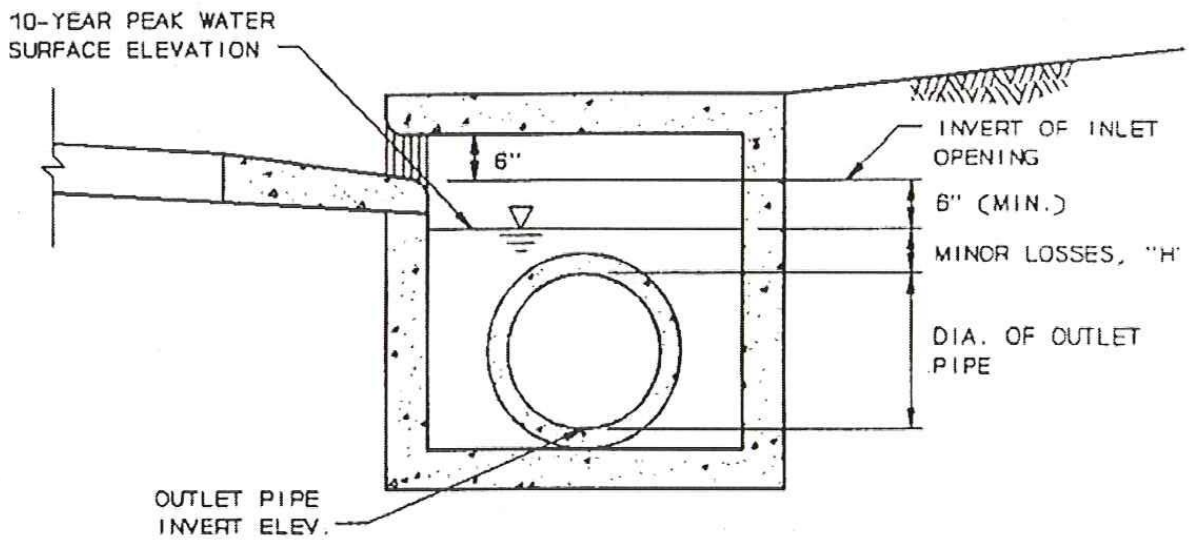
Ref: APWA (3/90)



*City of Cartersville, Missouri*  
 STORMWATER MANAGEMENT CRITERIA

CURB OPENING INLETS  
 CAPACITY IN SUMP

FIGURE 9



$$"H" = K(V^2 / 2G)$$

NOTES:

1. SEE TABLE F FOR VALUES OF "K".
2.  $V = Q/A$  WHERE  
 $Q =$  FLOW, IN CFS  
 $A =$  CROSS-SECTIONAL AREA OF OUTLET PIPE, IN SQ. FT.
3.  $2G = 64.4$  FT. PER SEC. PER SEC.

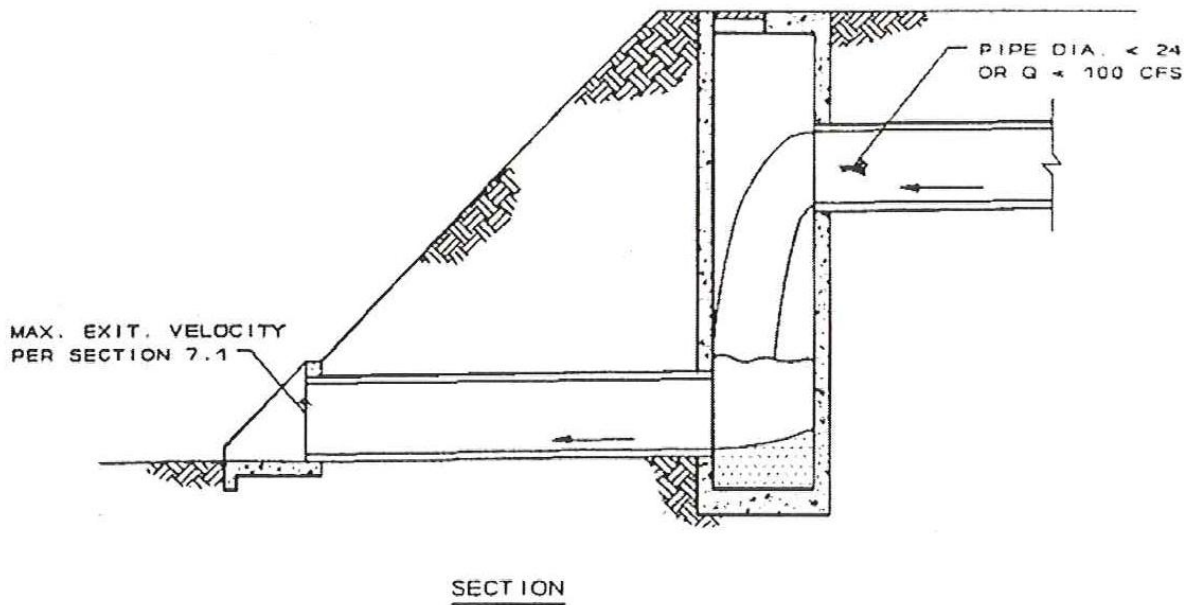
Ref: APWA (3/90)



*City of Carterville, Missouri*  
 STORMWATER MANAGEMENT CRITERIA

CURB OPENING INLETS  
 DIMENSIONAL CRITERIA

FIGURE 10



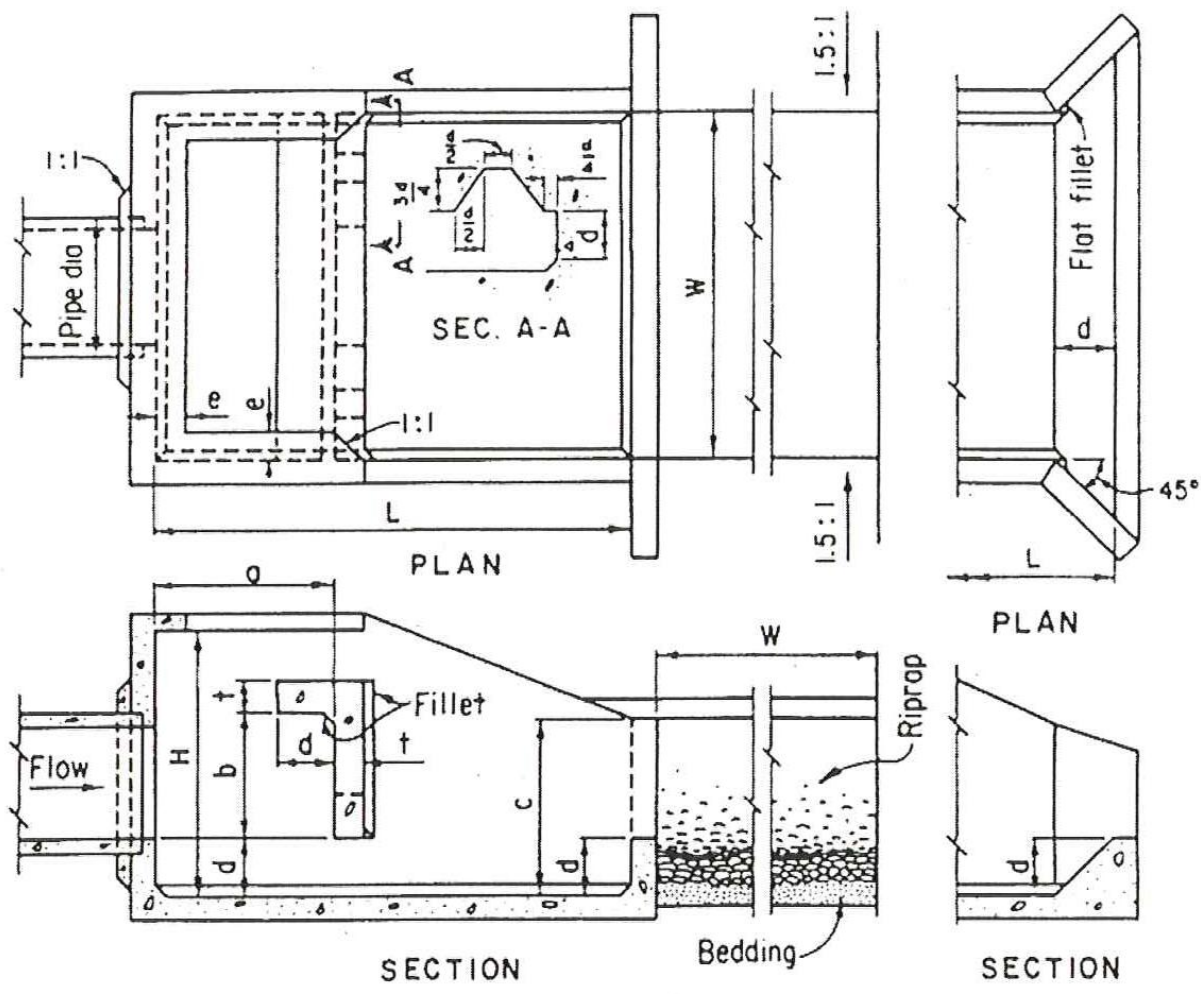
Ref: U.S. Bureau of Reclamation



*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

ENCLOSED DROP  
ENERGY DISSIPATORS

FIGURE 11



$H = 3W/4$	$c = W/2$
$L = 4W/3$	$d = W/6$
$o = W/2$	$e = W/12$
$b = 3W/8$	$t = W/12$ suggested minimum thickness

Ref: U.S. Bureau of Reclamation

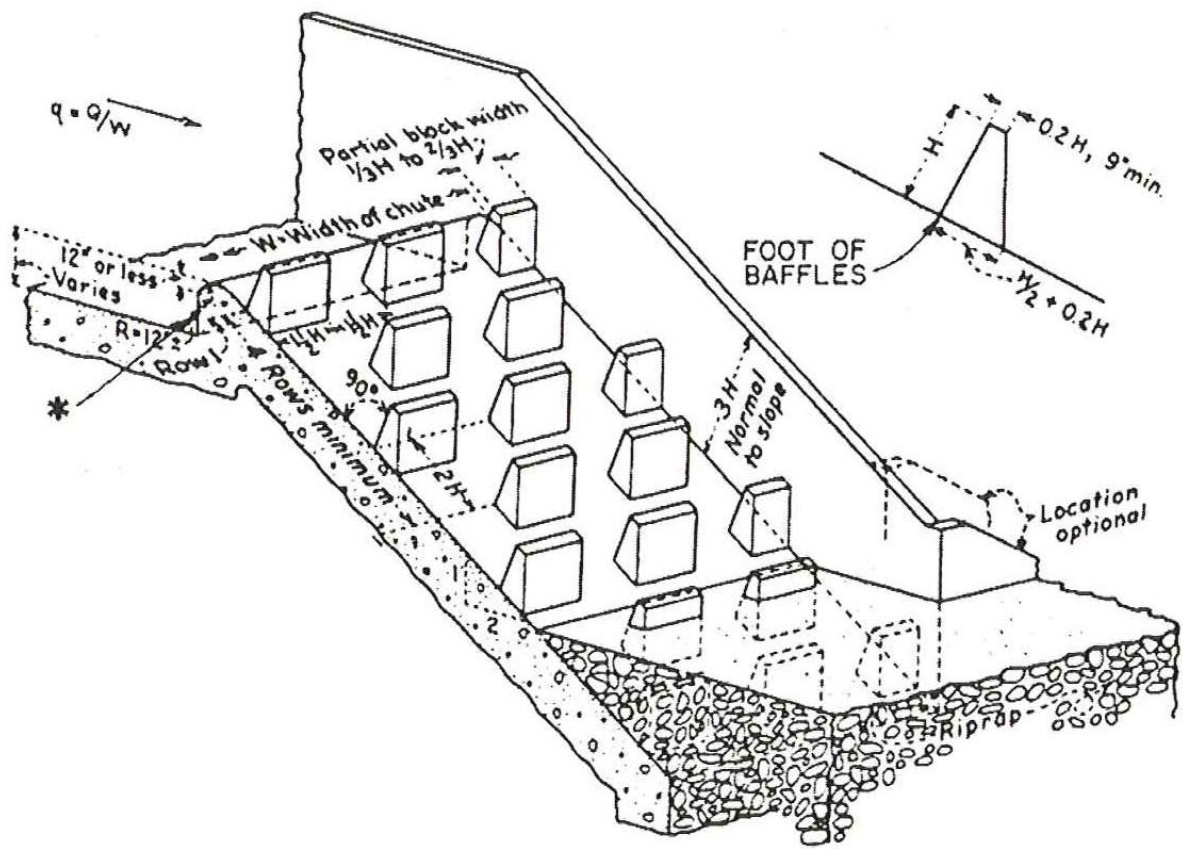
ALTERNATE  
END SILL AND  
WING WALL



*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

BUREAU OF RECLAMATION  
TYPE IV BASIN

FIGURE 12



\* SILL IS REQUIRED WHERE ENTRANCE VELOCITY CANNOT BE CONTROLLED BY THE UPSTREAM CHANNEL CON- STRICTION, BUT FOR GRASS-LINED CHANNEL THE SILL ELEVATION NEEDS TO BE THE SAME AS THE CHANNEL, OTHERWISE UPSTREAM SILTATION WILL OCCUR.

Ref: U.S. Bureau of Reclamation

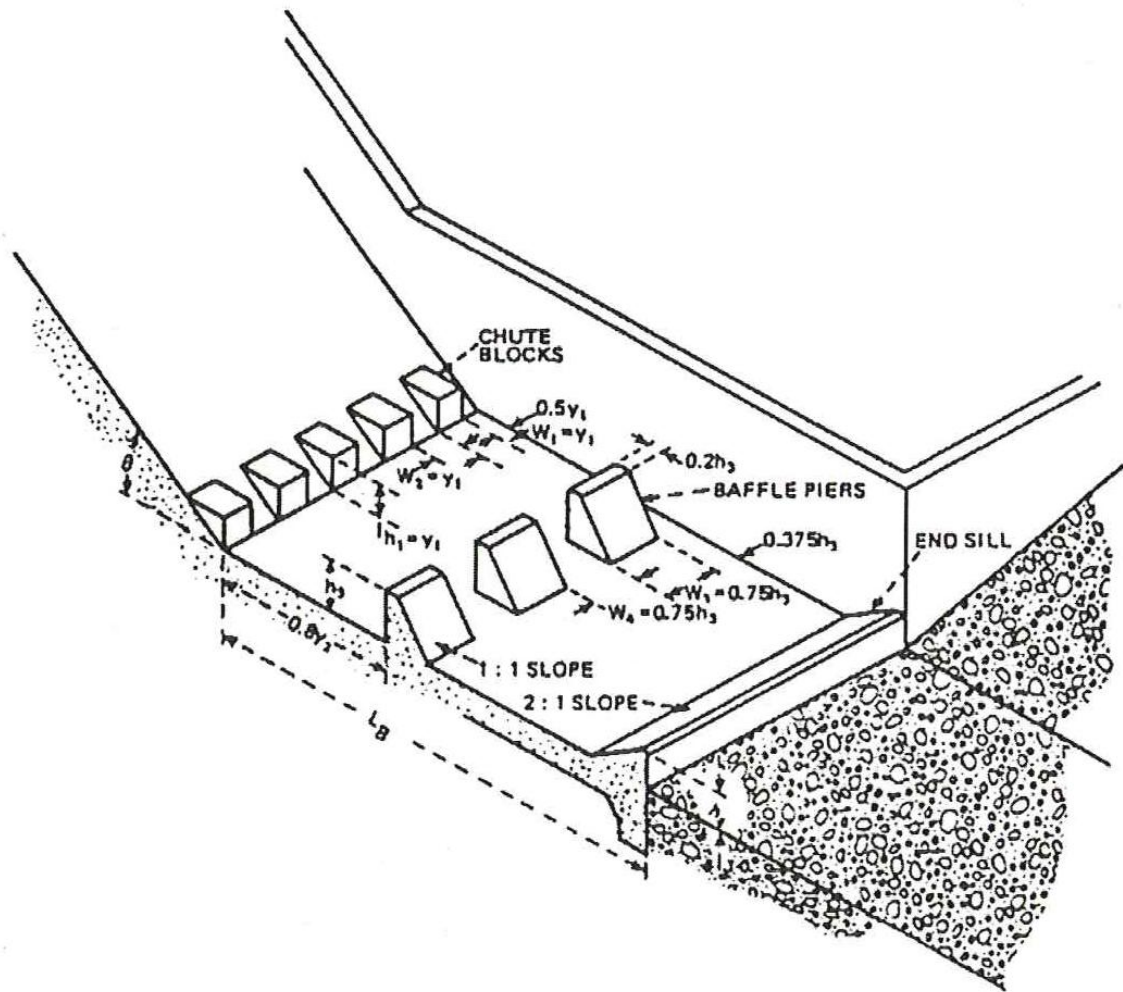


*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

BUREAU OF RECLAMATION  
TYPE IX BASIN

FIGURE 13





Ref: U.S. Bureau of Reclamation



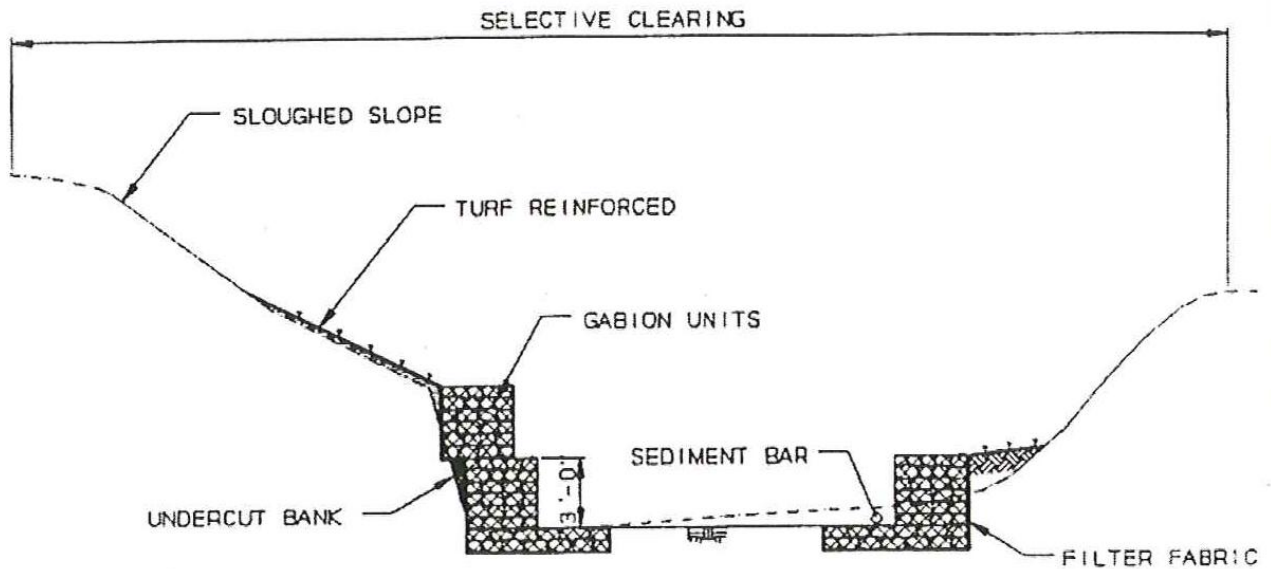
*City of Carterville, Missouri*  
 STORMWATER MANAGEMENT CRITERIA

BUREAU OF RECLAMATION  
 TYPE III BASIN

FIGURE 14

NOTES:

1. SELECTIVE CLEARING TO REMOVE DEADFALL, TREES WITH UNDERCUT ROOTS, AND BRUSH. SOUND TREES MAY REMAIN.
2. HEIGHT OF GABION STRUCTURE VARIES. CONSTRUCT TO APPX. EQUAL HEIGHT OF EXISTING VERTICAL BANK FACE.



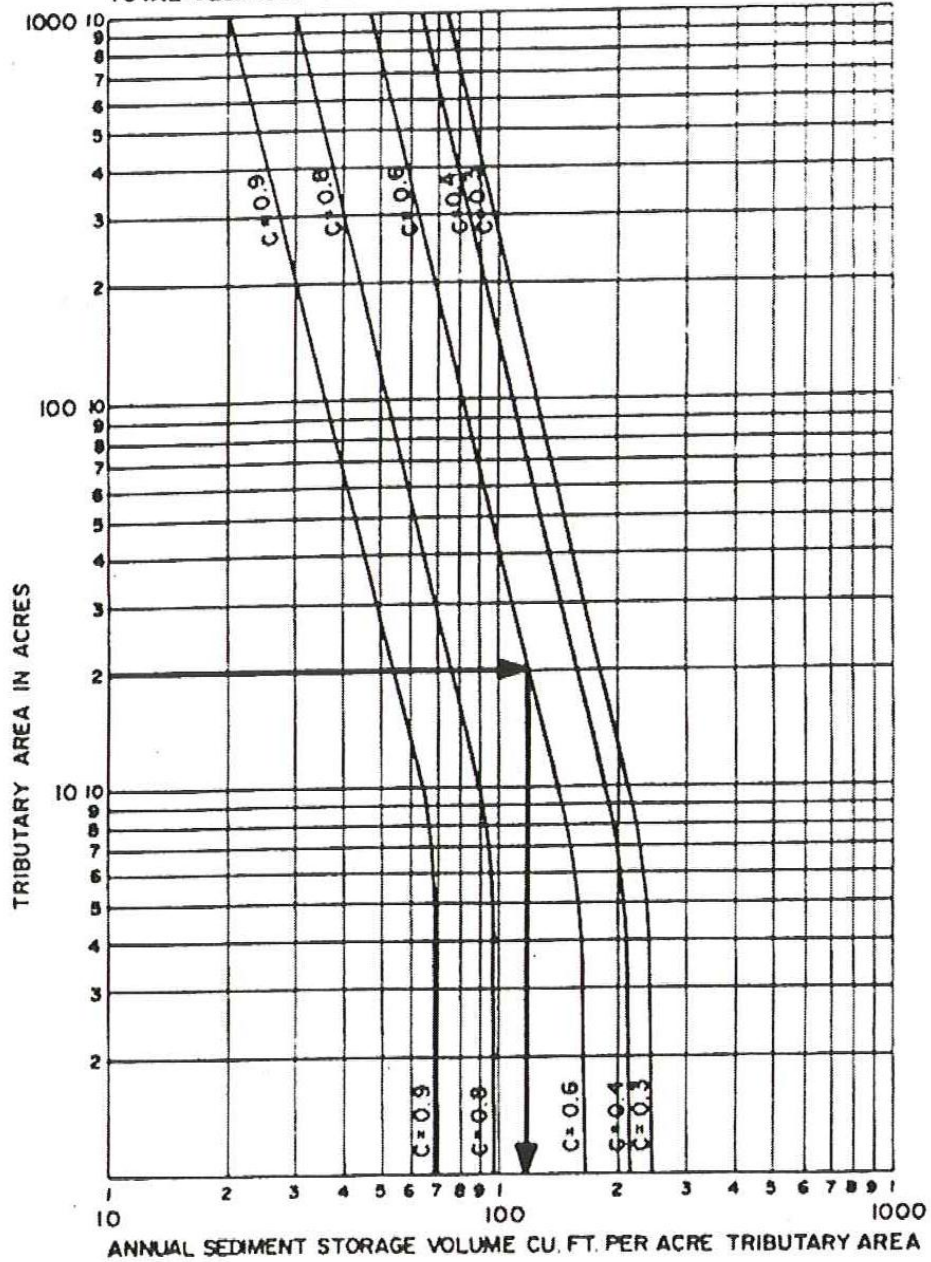
**EXAMPLE:**

TRIBUTARY AREA = 20 ACRES

RATIONAL METHOD RUNOFF COEFFICIENT "C" = 0.6

SEDIMENT STORAGE = 120 CU. FT. PER ACRE PER YEAR

TOTAL SEDIMENT STORAGE = 120 X 20 = 2400 CU. FT. PER YEAR.



Ref: APWA (3/90)

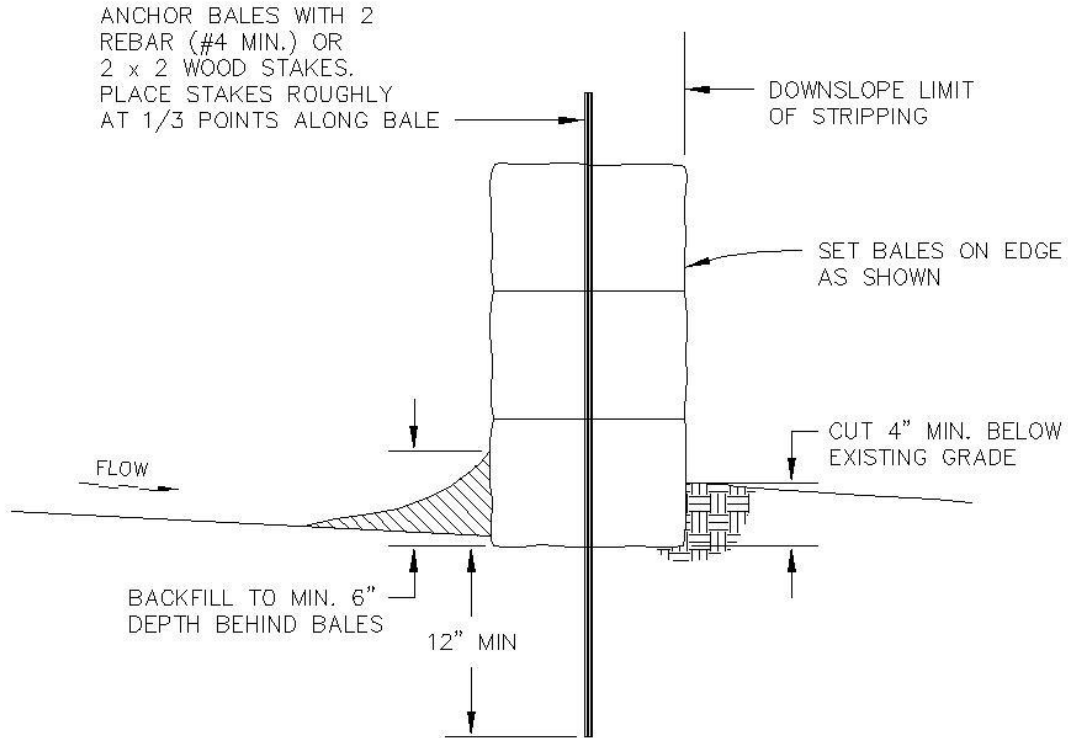


*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

ESTIMATED ANNUAL  
SEDIMENT ACCUMULATION

FIGURE 16





NOTES:

1. PLACE HAY BALE DIKE AT DOWNSCOPE LIMIT OF AREA TO BE GRADED.
2. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
3. BALES SHALL BE PLACED ALONG A LEVEL CONTOUR WITH AN ALLOWANCE OF  $\pm 4$  INCHES.
4. SEDIMENT TRAPPED SHALL BE DISPOSED IN AN APPROVED LOCATION IN A MANNER WHICH WILL NOT CONTRIBUTE ADDITIONAL SILTATION.
5. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR INCHES.
6. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
7. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY CONTRACTOR.
8. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
9. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES.
10. AT EACH END OF DIKE, TURN DIKE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18 INCHES.

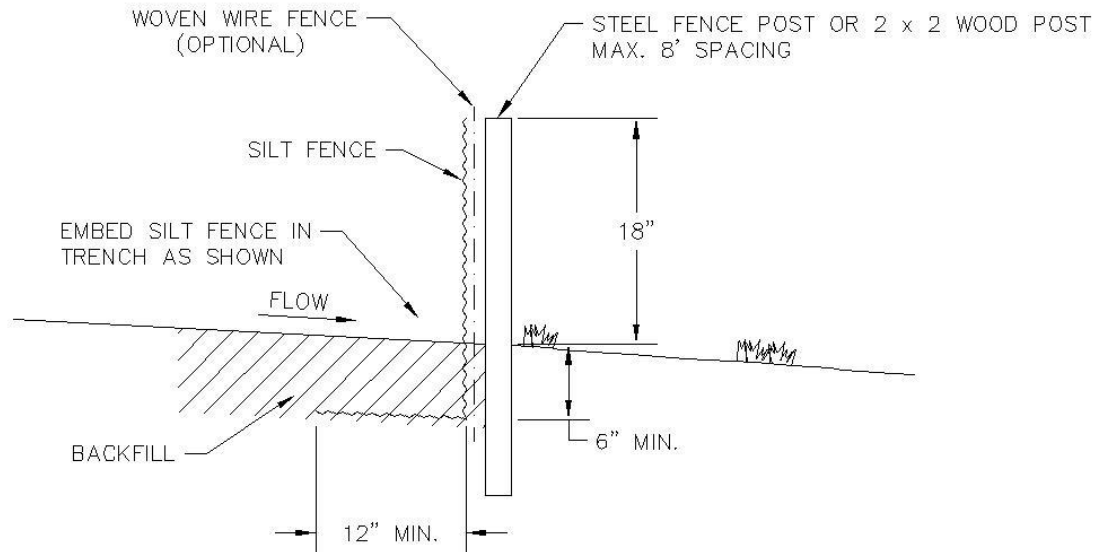
REFERENCE: Adapted from City of Austin & City of Tulsa Erosion and Sedimentation Control Manuals



*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

HAY BALE DIKE

FIGURE 17

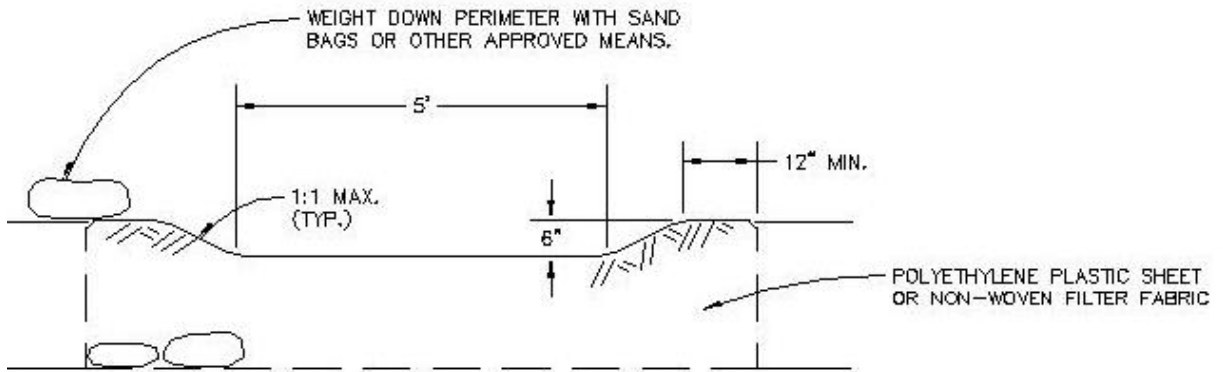


NOTES:

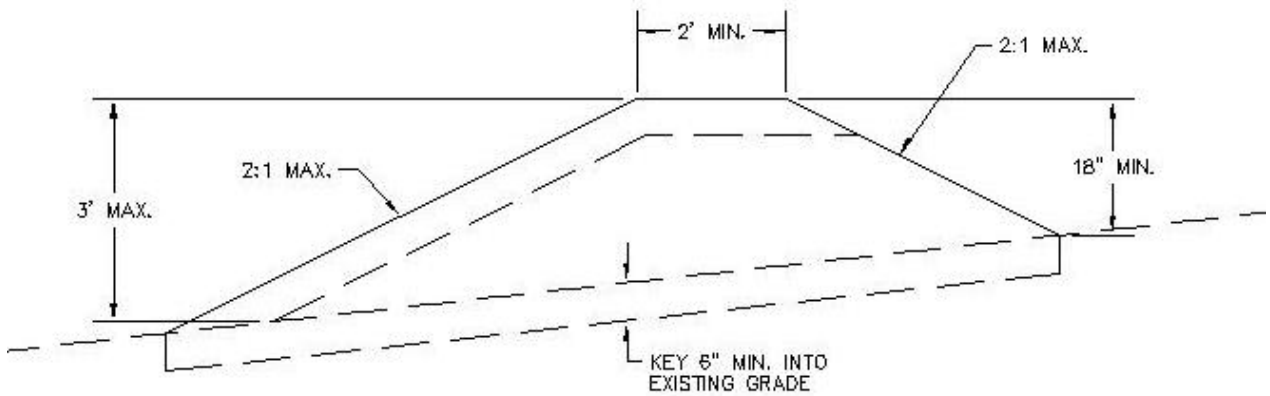
1. PLACE SILT FENCE AT DOWNSLOPE LIMIT OF AREA TO BE GRADED.
2. SILT FENCE SHALL BE PLACED ALONG A LEVEL CONTOUR WITH AN ALLOWANCE OF  $\pm 4$  INCHES.
3. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES.
8. AT EACH END OF SILT FENCE, TURN FENCE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18 INCHES.

REFERENCE: Adapted from City of Austin & City of Tulsa Erosion and Sedimentation Control Manuals





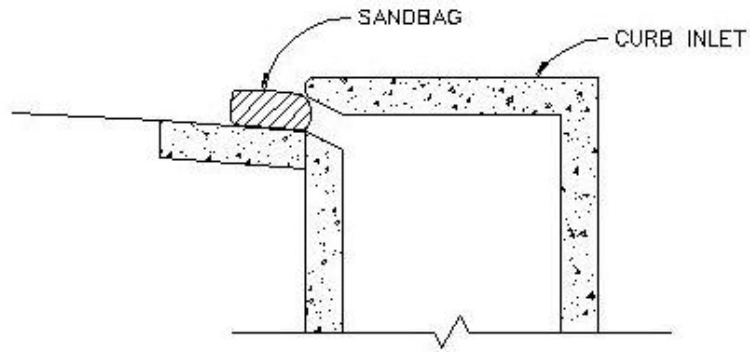
OVERFLOW AREA



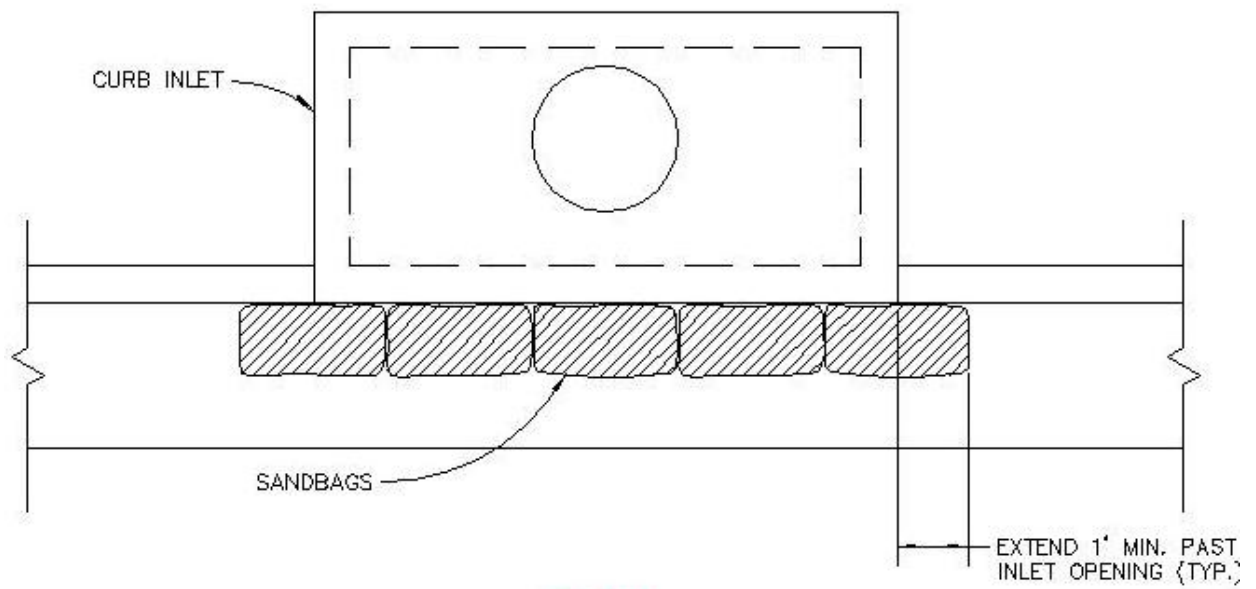
NOTES:

1. SOIL IN BERM SHALL BE FIRMLY COMPACTED.
2. AT EACH END OF BERM, TURN BERM UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES TO TOP OF BERM ELEVATION.
3. PROVIDE OVERFLOW AREAS AT 200 FT. MAX. INTERVALS.





CROSS-SECTION

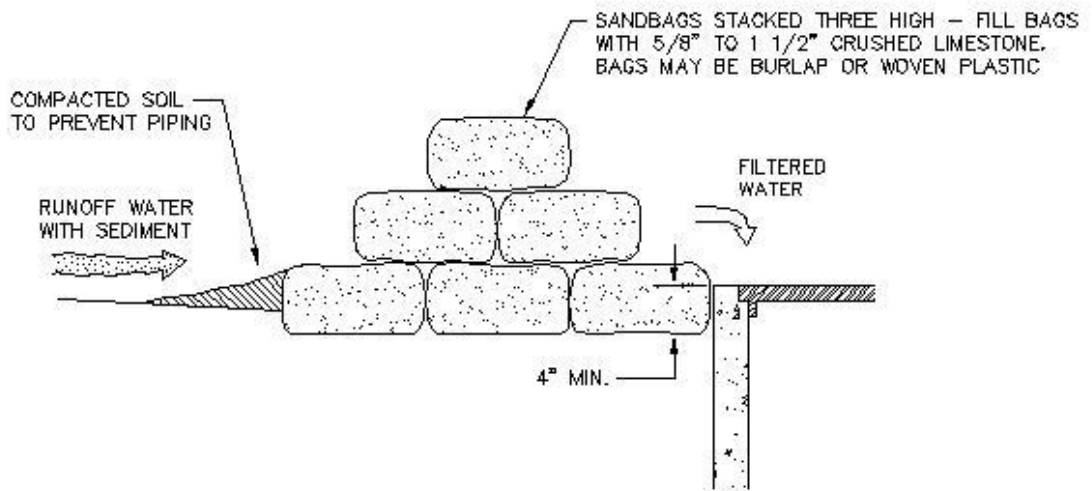
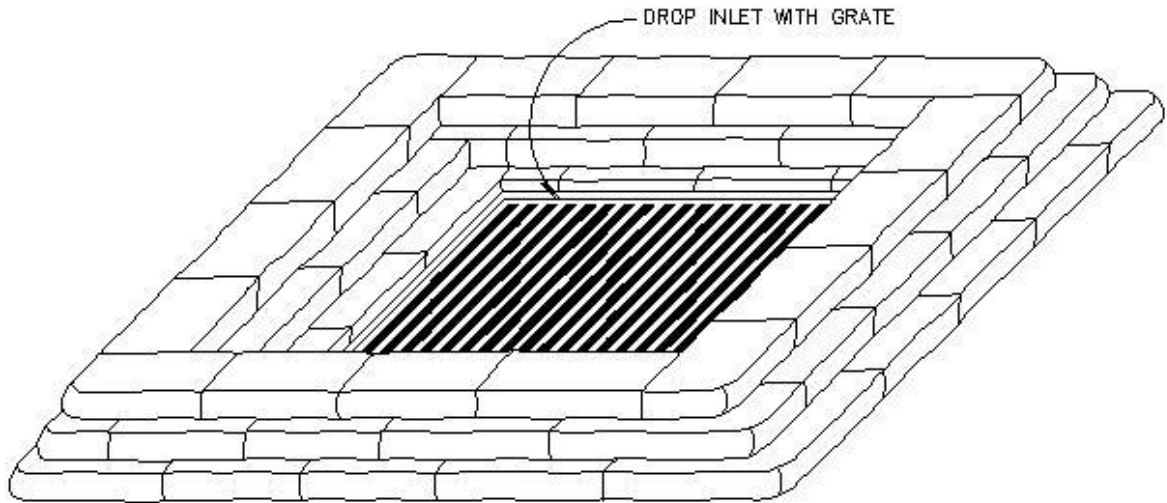


PLAN

NOTES:

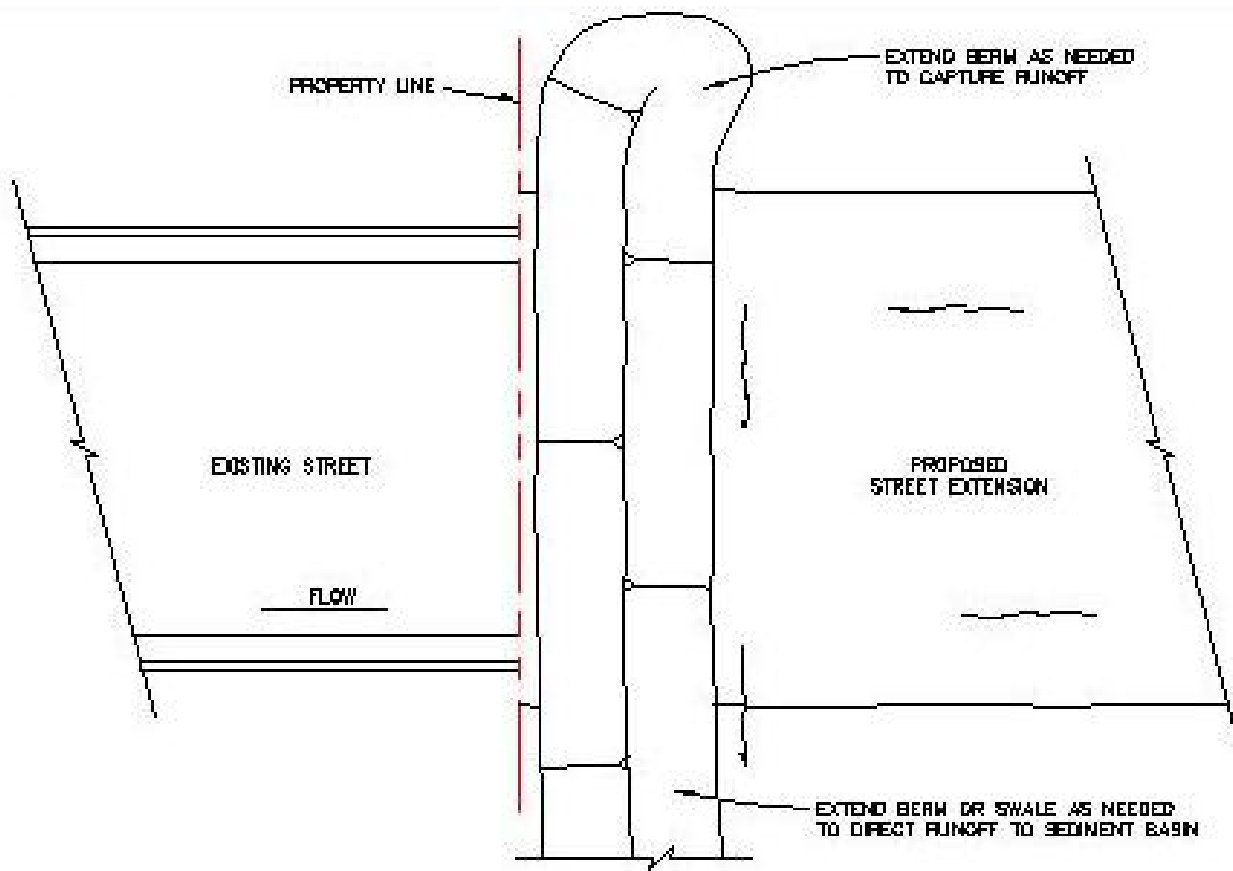
1. FILL BAGS WITH 5/8" CRUSHED LIMESTONE.
2. BAGS SHALL BE BURLAP OR BIODEGRADABLE PLASTIC.
3. BAGS SHALL BE INSPECTED AND REPLACED AS NEEDED.



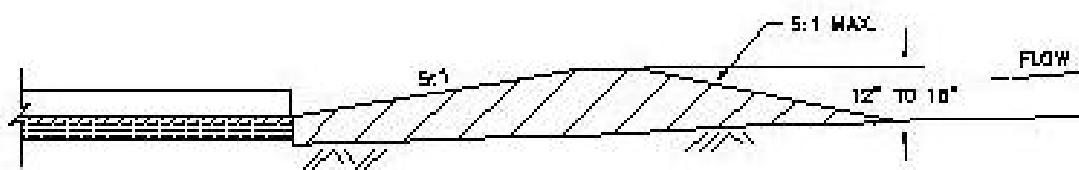


*DROP INLET SEDIMENT FILTER*





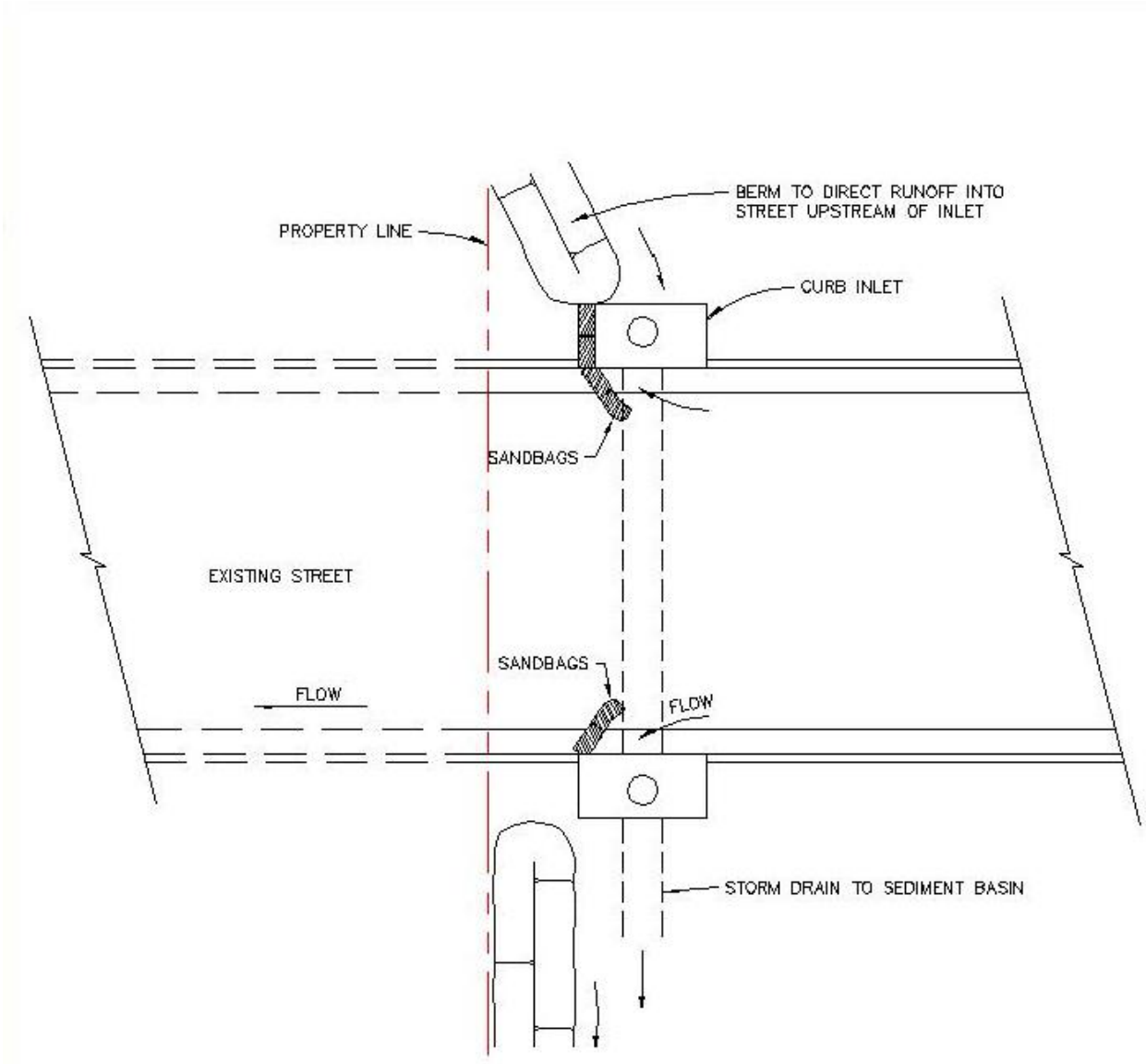
PLAN



CROSS-SECTION

CASE 1  
AFTER INITIAL EXCAVATION  
OF SUBGRADE





NOTE: FILL SANDBAGS WITH CHAT OR LIMESTONE SAND

CASE 2  
AFTER PAVEMENT AND  
INLETS COMPLETED

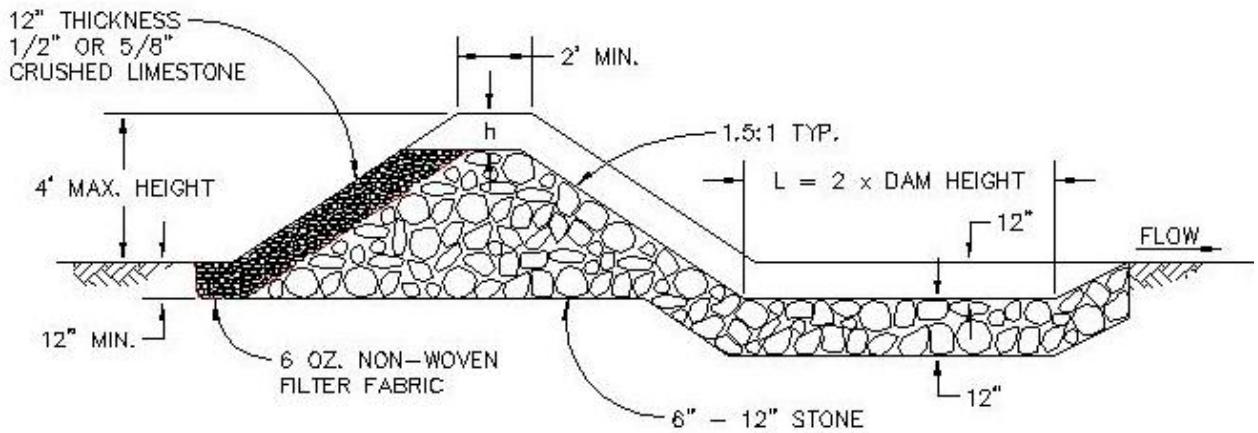


*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

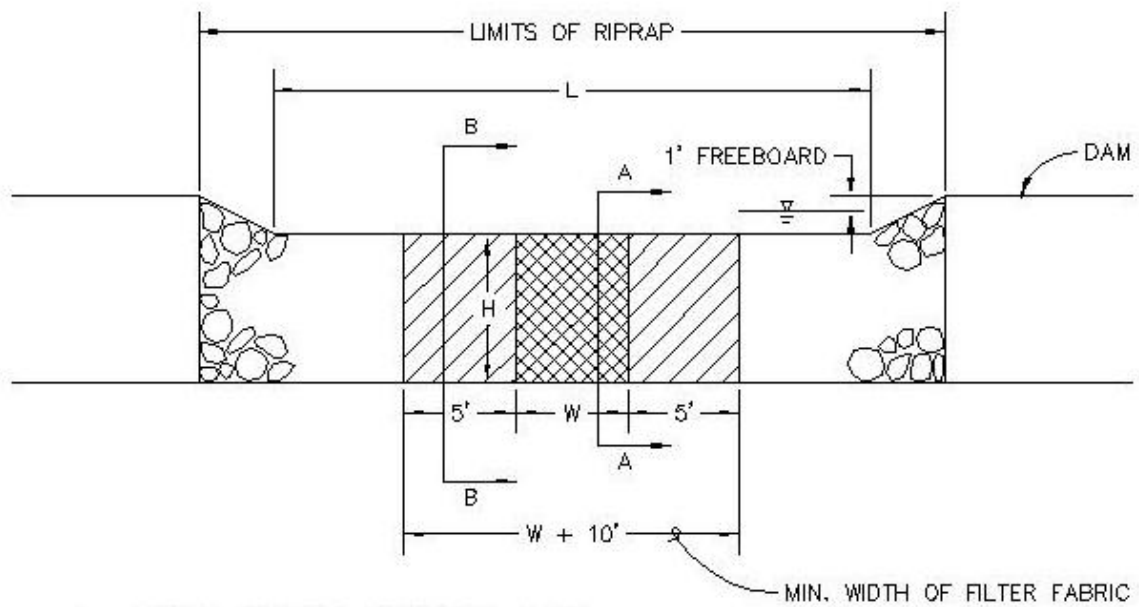
DIVERSION OF RUNOFF  
CURBED STREET

FIGURE 23





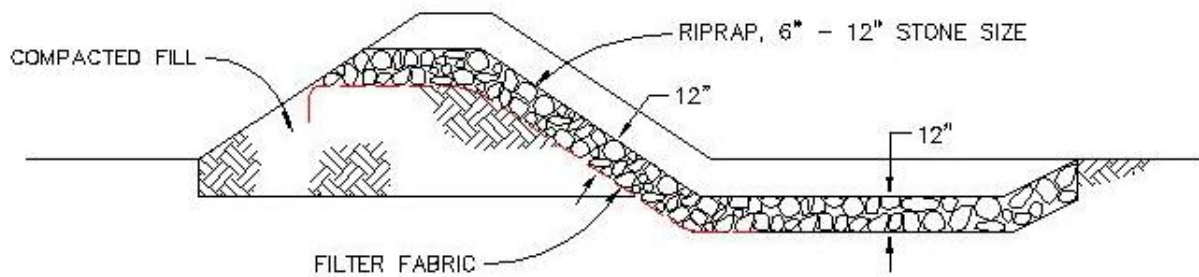
SECTION A - A (THRU GRAVEL FILTER)



L = LENGTH REQUIRED TO PASS  $Q_{10}$  WHILE  
 MAINTAINING 1 FT. OF FREEBOARD  
 W = WIDTH OF ROCK FILTER AREA

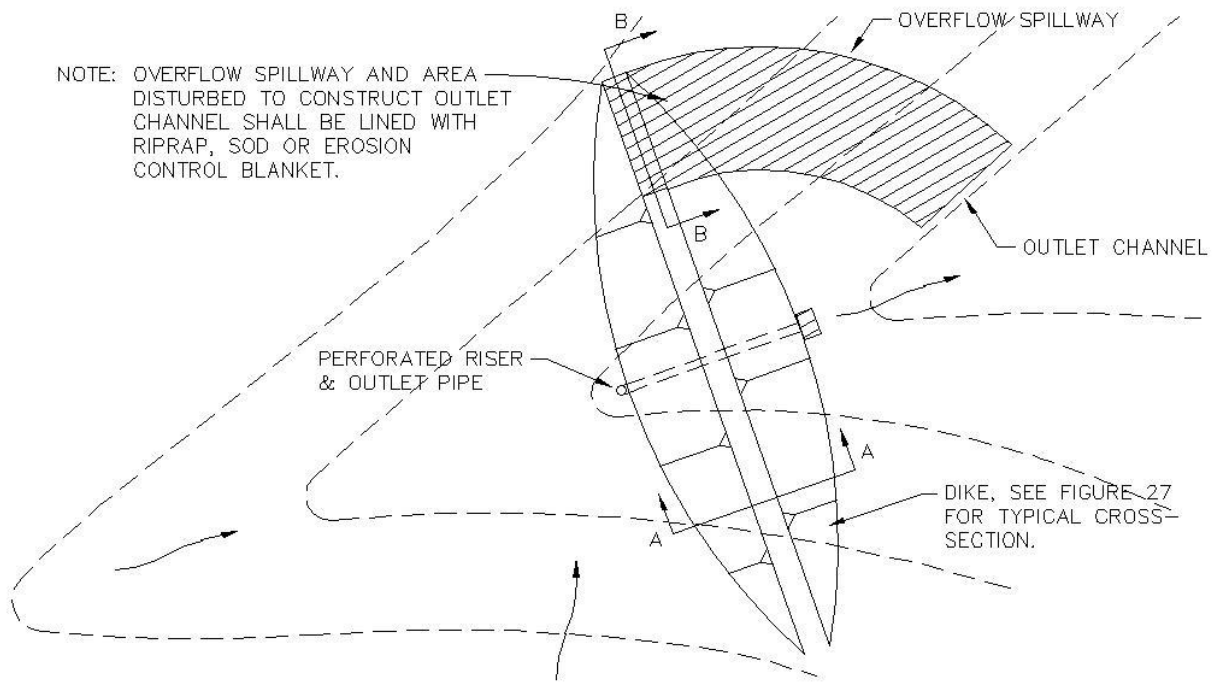






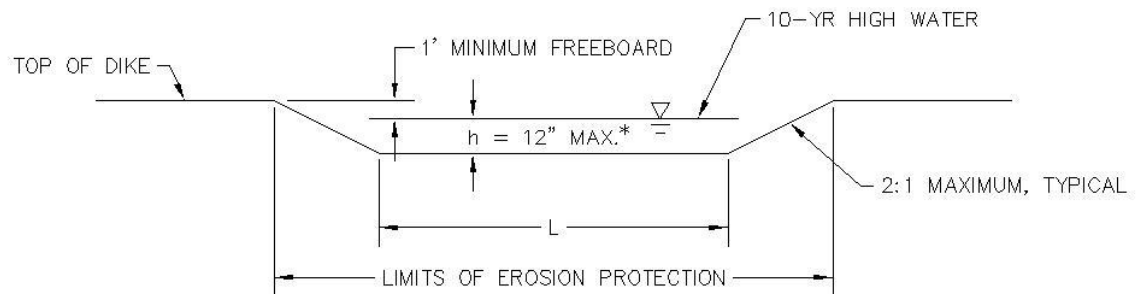
SECTION B - B  
(FIGURE 24)





*TYPICAL COMPONENTS OF TEMPORARY SEDIMENT BASIN PLAN*

(PERFORATED RISER PIPE AND OVERFLOW SPILLWAY SHOWN. GRAVEL FILTER DAM AND RIPRAP OVERFLOW SPILLWAY AS SHOWN IN FIGURES 24 AND 25 MAY ALSO BE USED.)



\* $h = 6'' \text{ MAX.}$  IF SOD LINING USED

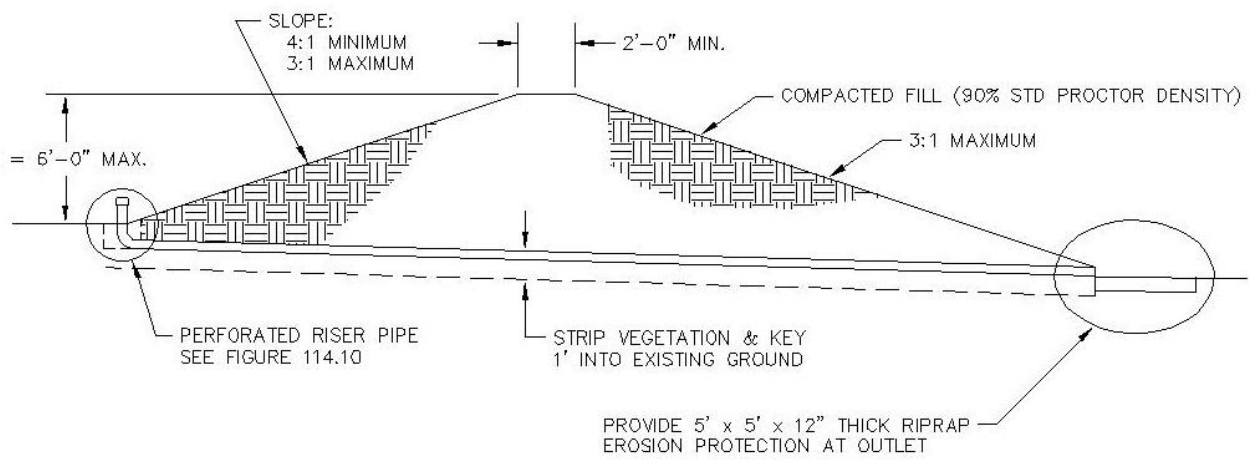
*SECTION B - B  
TYPICAL OVERFLOW SPILLWAY CROSS-SECTION*



*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

TEMPORARY SEDIMENT  
BASIN

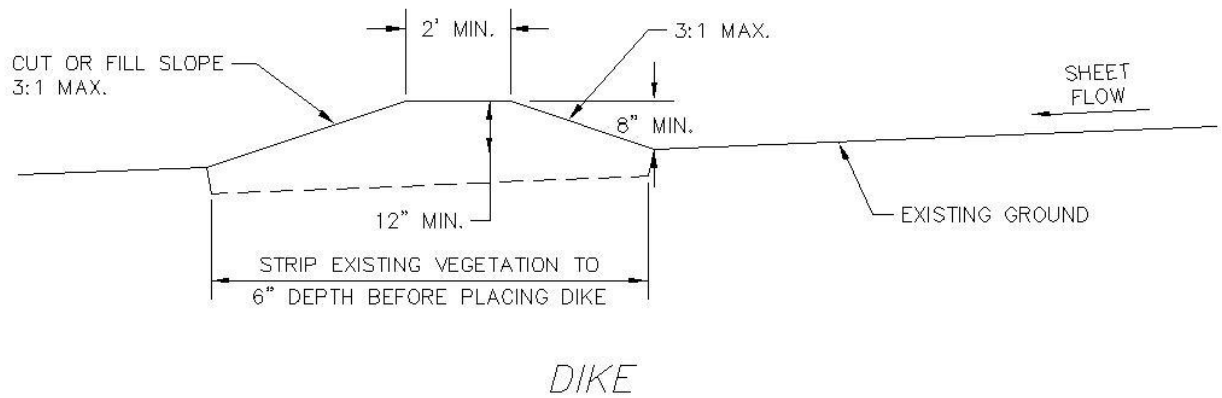
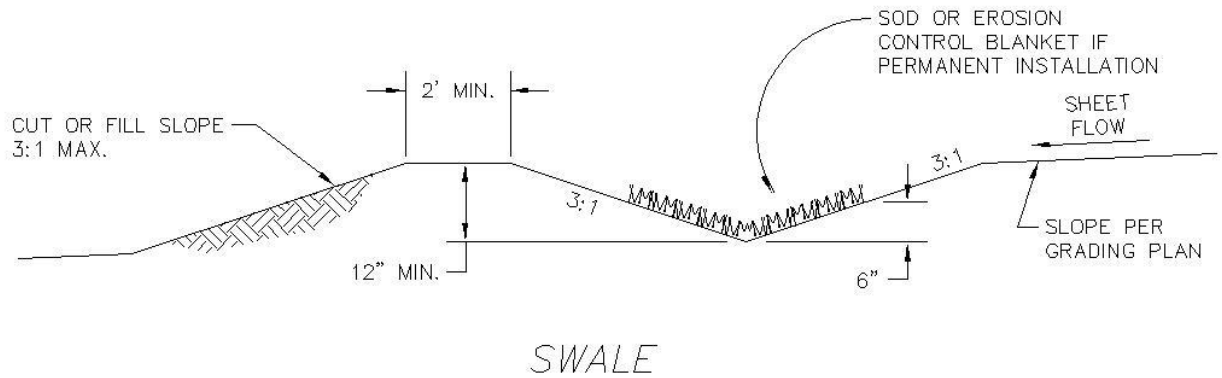
FIGURE 26



SECTION A — A  
(FIGURE 26)







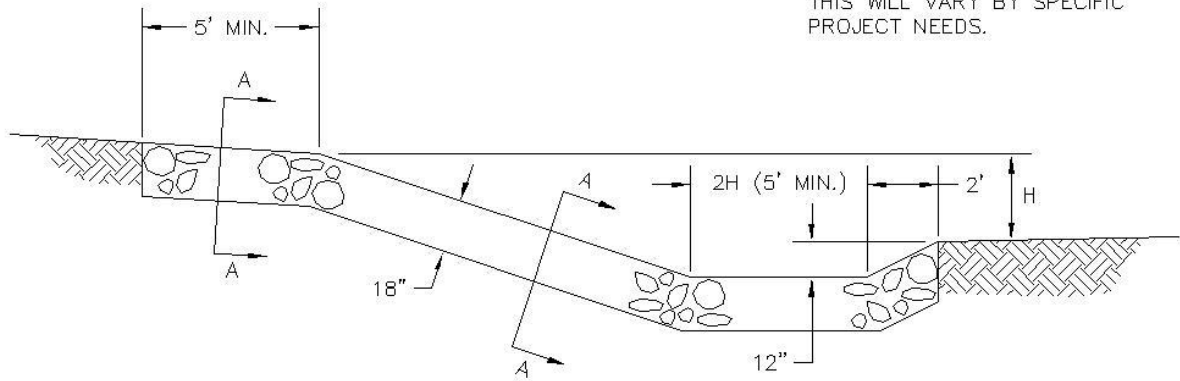
NOTES:

1. DIKE SHALL BE COMPACTED TO DENSITY EQUAL TO THAT SPECIFIED FOR ADJOINING AREA (90% STANDARD PROCTOR DENSITY, MINIMUM).
2. MINIMUM 1% GRADE MUST BE PROVIDED FOR SWALE OR ALONG UPSLOPE SIDE OF DIKE FOR PROPER DRAINAGE.

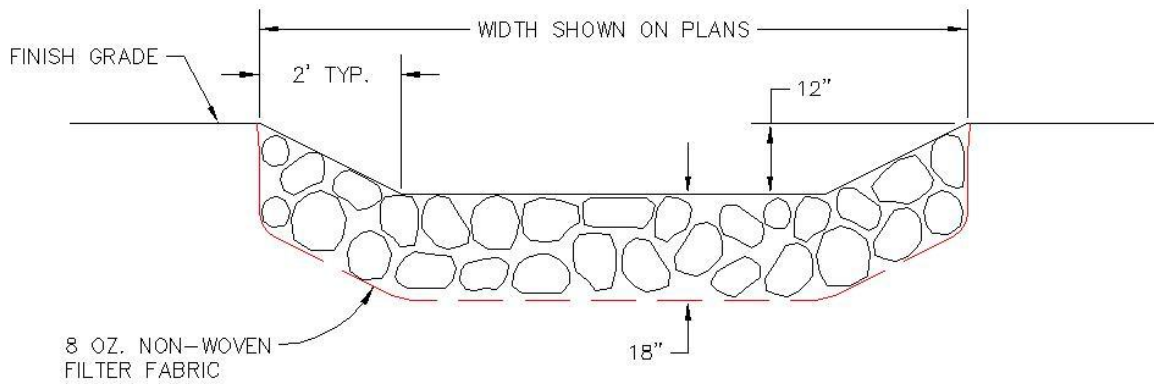
REFERENCE: Adapted from City of Austin & City of Tulsa Erosion and Sedimentation Control Manuals



PLANS TO SPECIFY WHETHER  
RIPRAP IS LOOSE OR GROUTED.  
THIS WILL VARY BY SPECIFIC  
PROJECT NEEDS.

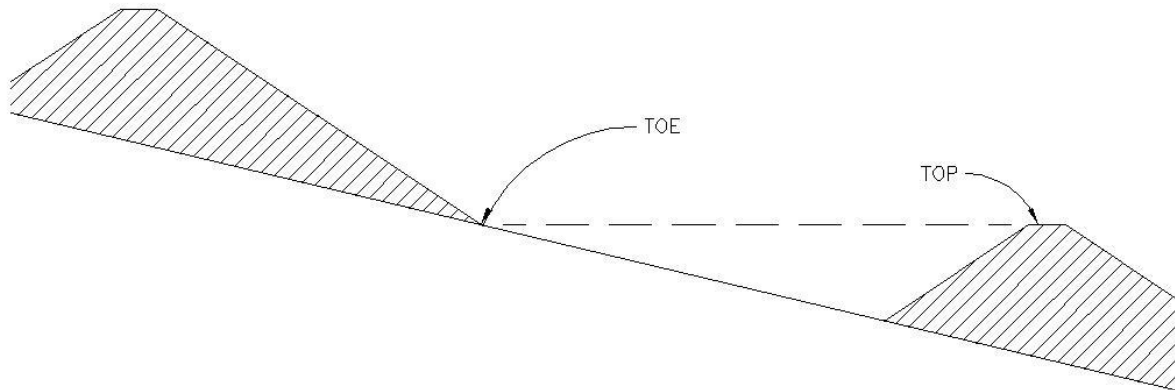
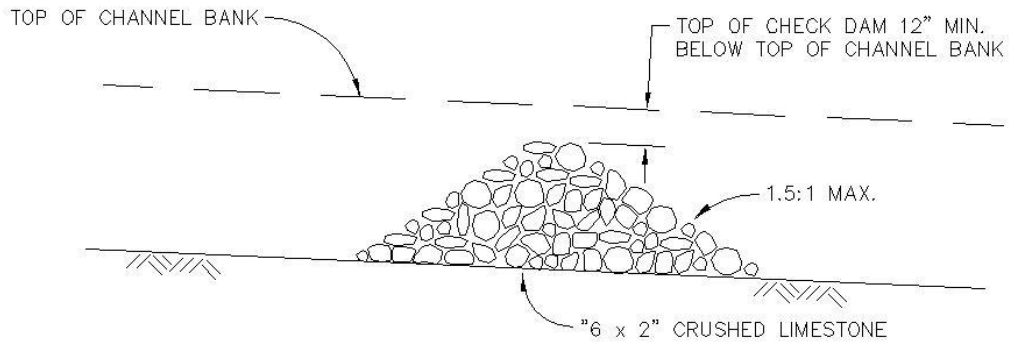


TYPICAL SECTION



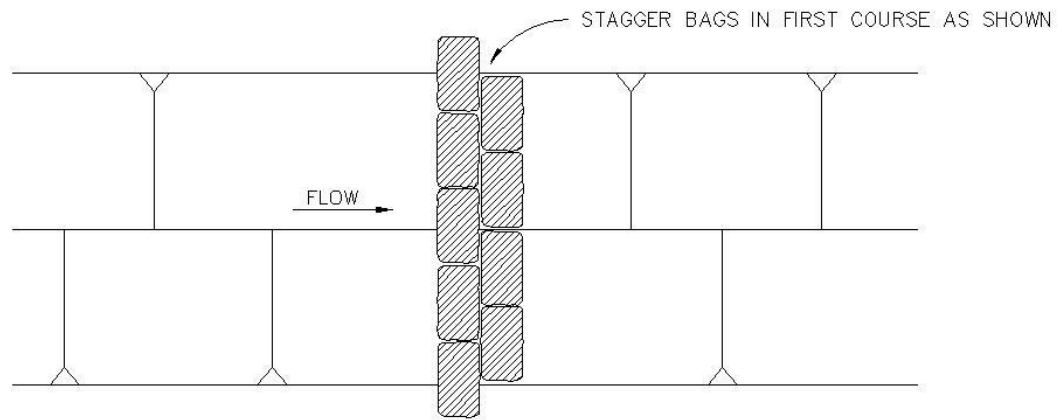
SECTION A - A



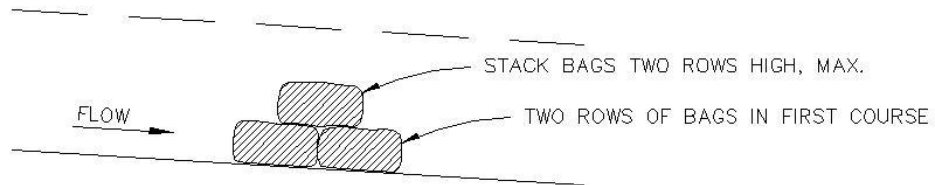


TYPICAL CHECK DAM SPACING





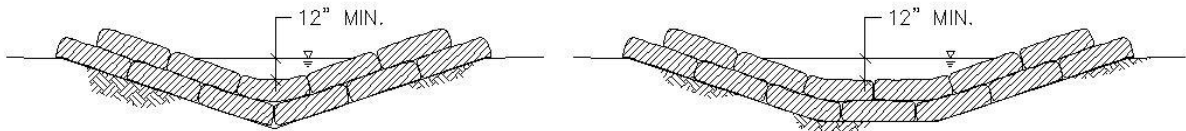
PLAN



PROFILE

NOTES:

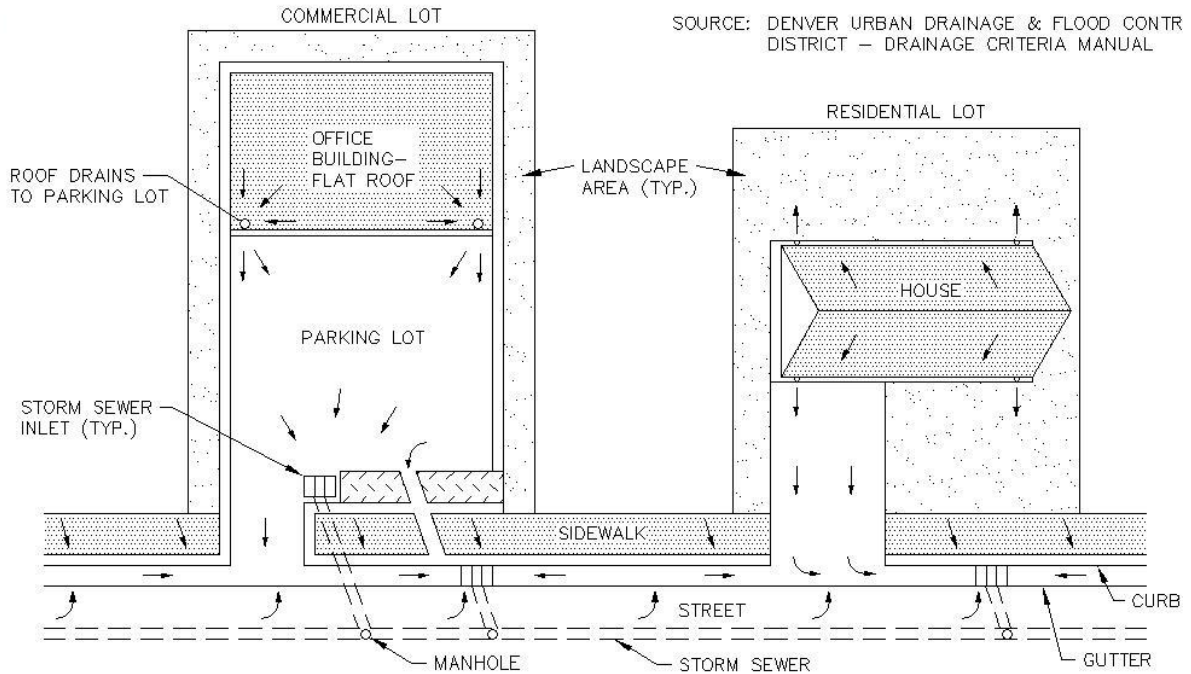
FILL BAGS WITH 5/8" TO 1 1/2" CRUSHED LIMESTONE.  
 BAGS MAY BE BURLAP OR WOVEN PLASTIC.  
 SPACE CHECK DAMS AS SHOWN IN FIG. 31 OR AS  
 SPECIFIED ON SEDIMENT & EROSION CONTROL PLAN.



TYPICAL CROSS-SECTIONS

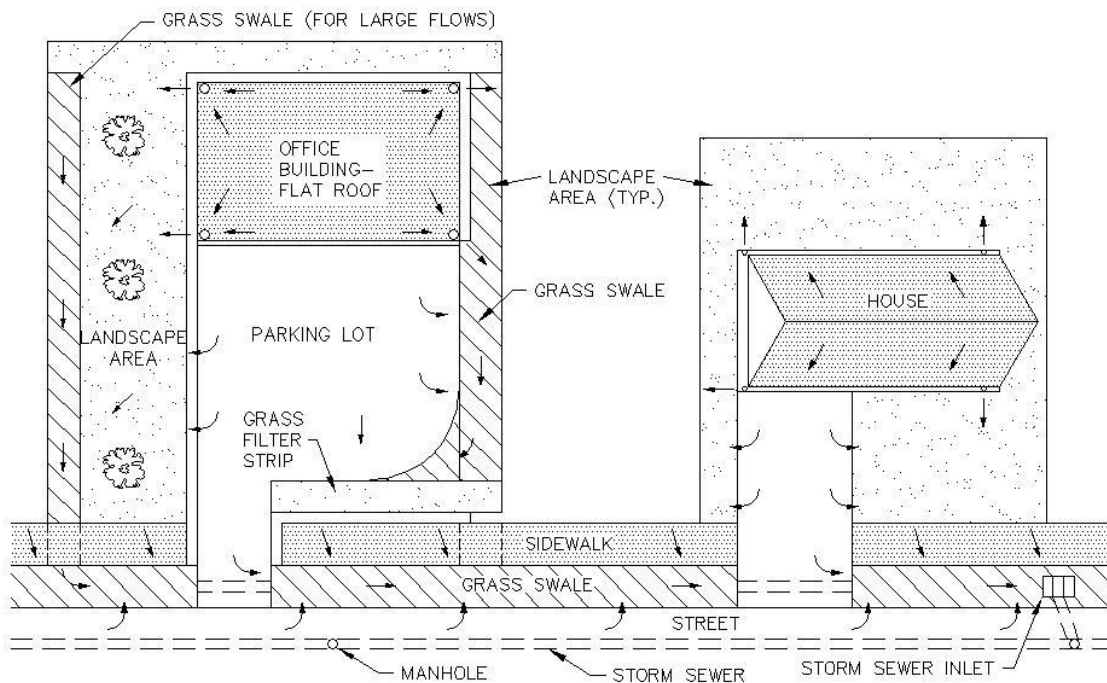






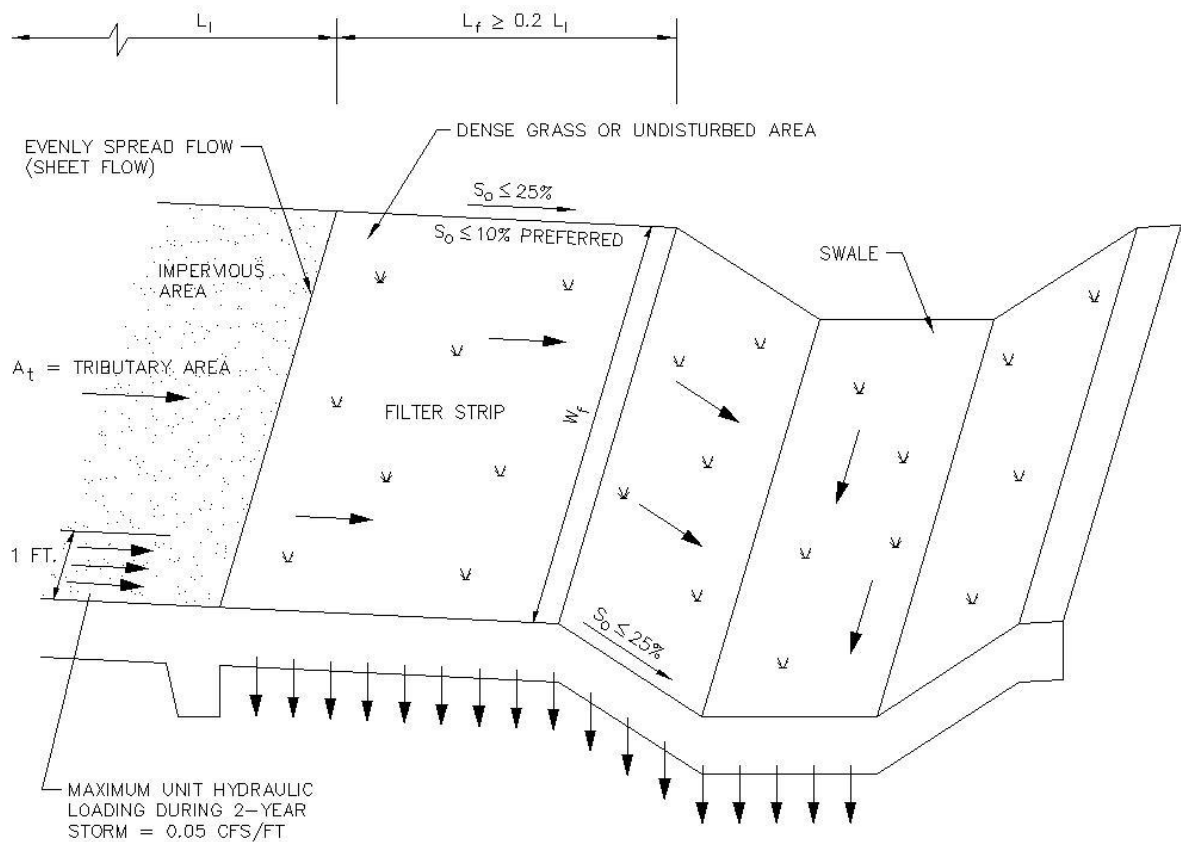
SOURCE: DENVER URBAN DRAINAGE & FLOOD CONTR DISTRICT - DRAINAGE CRITERIA MANUAL

*TRADITIONAL SITE & STREET DRAINAGE DESIGN*



*MINIMIZING DIRECTLY CONNECTED IMPERVIOUS AREAS*





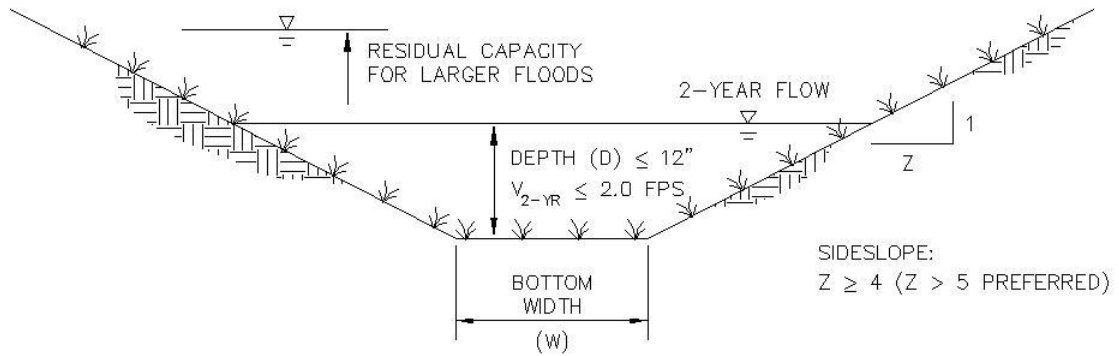
ADAPTED FROM DENVER URBAN DRAINAGE & FLOOD CONTROL DISTRICT - DRAINAGE CRITERIA MANUAL



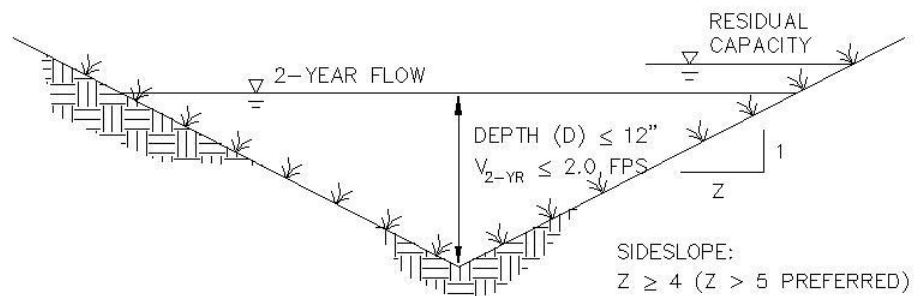
*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

VEGETATIVE FILTER STRIP  
WATER QUALITY BMP

FIGURE 34



*TRAPEZOIDAL GRASS-LINED SWALE SECTION*



*TRIANGULAR GRASS-LINED SWALE SECTION*

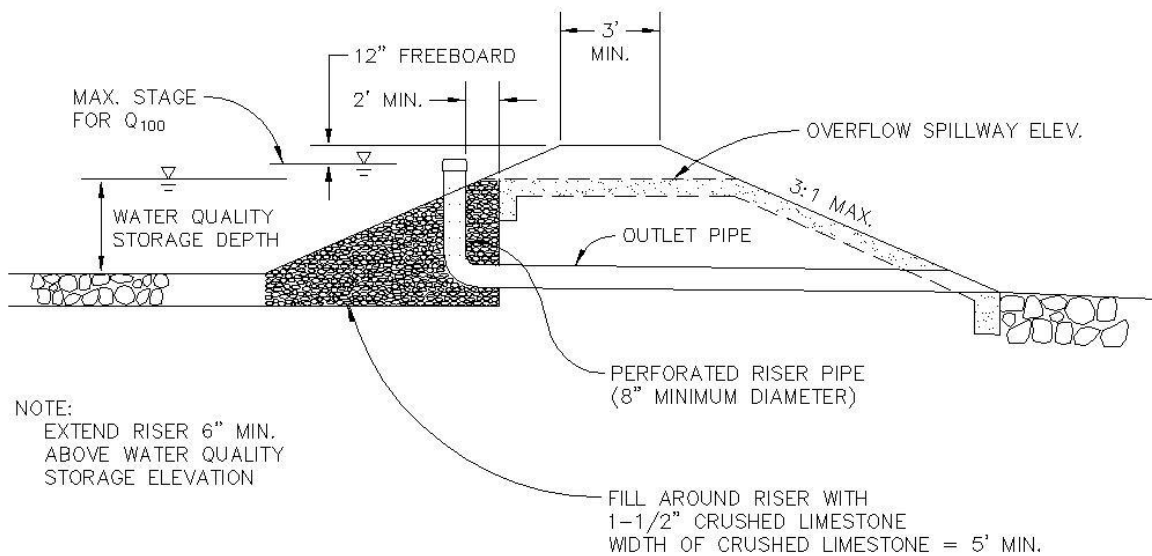
ADAPTED FROM DENVER URBAN DRAINAGE & FLOOD CONTROL DISTRICT – DRAINAGE CRITERIA MANUAL

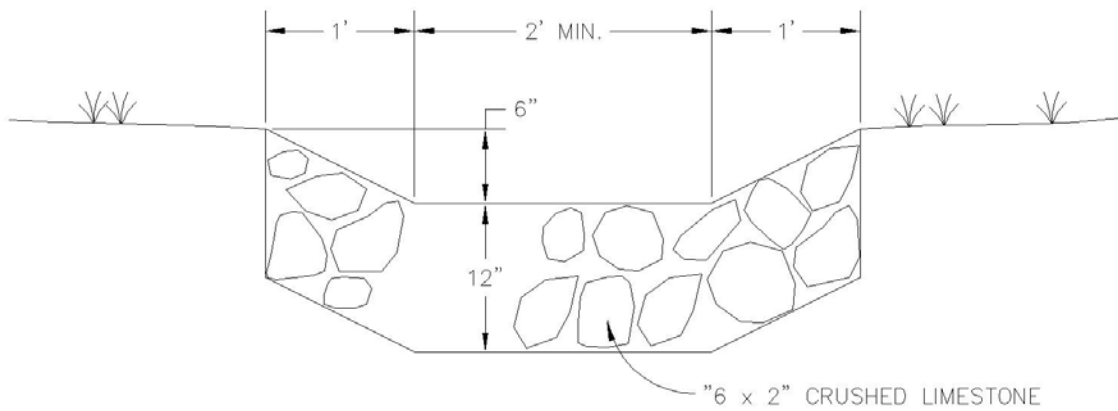


*City of Cartersville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

GRASS SWALE  
WATER QUALITY BMP

FIGURE 35

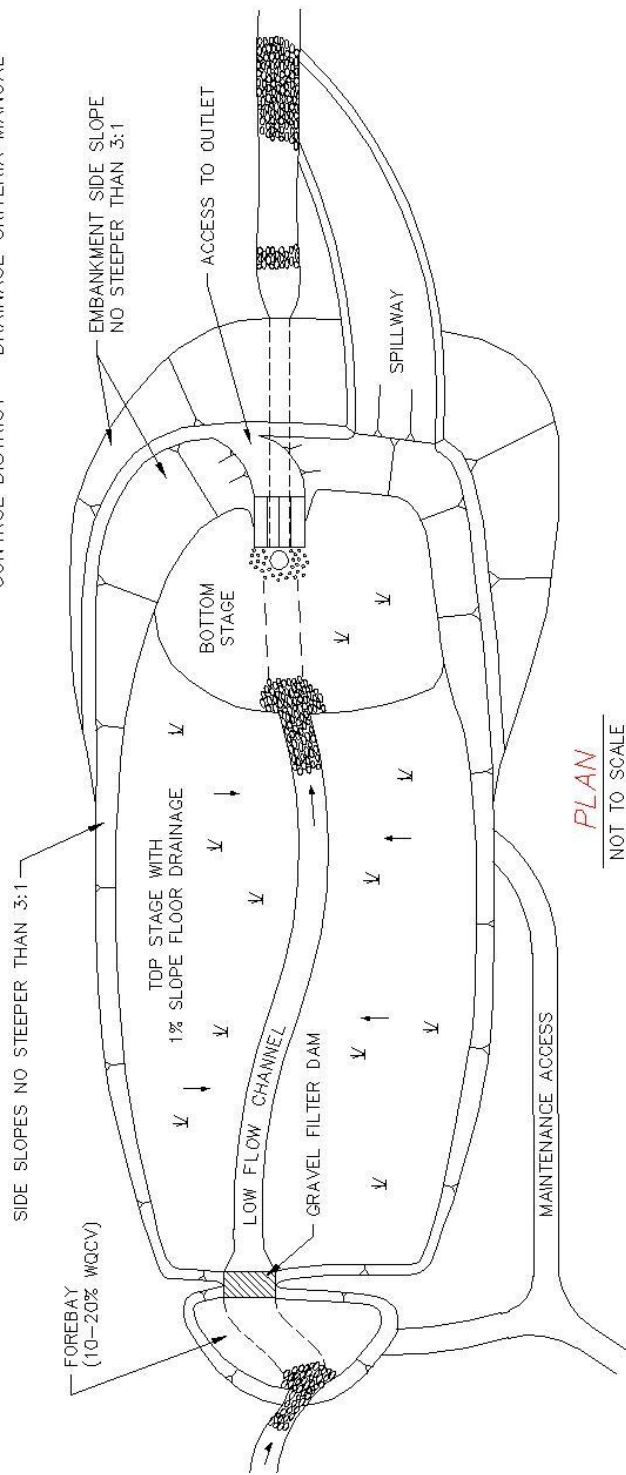




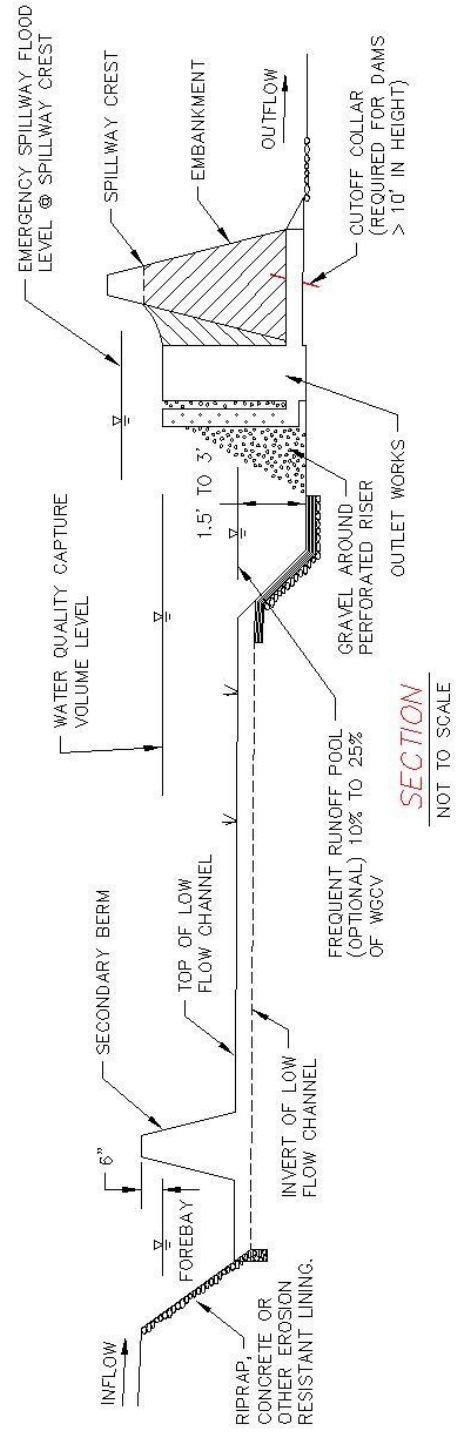
ROCK TRICKLE CHANNEL FOR  
 EXTENDED DRY DETENTION BASINS  
 TYPICAL CROSS SECTION  
 WATER QUALITY BMP



ADAPTED FROM DENVER URBAN DRAINAGE & FLOOD CONTROL DISTRICT - DRAINAGE CRITERIA MANUAL



PLAN  
NOT TO SCALE



SECTION  
NOT TO SCALE



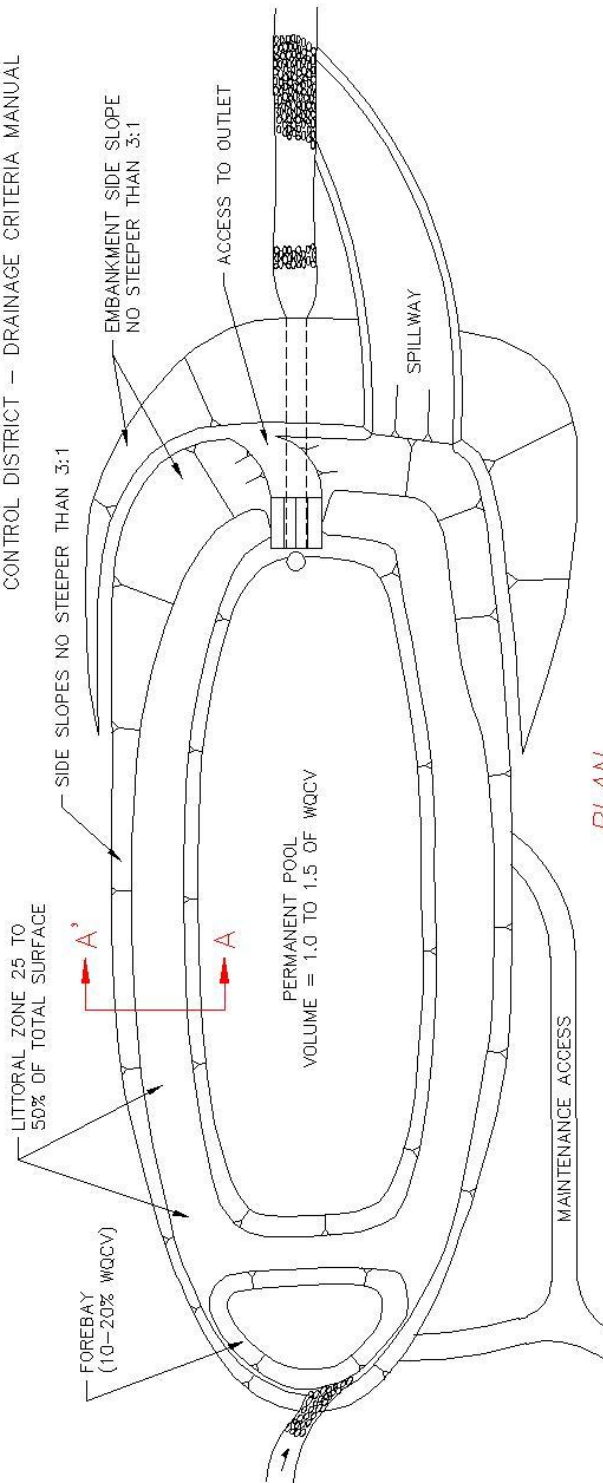
City of Carterville, Missouri  
STORMWATER MANAGEMENT CRITERIA

EXTENDED DRY DETENTION BASIN TYPICAL DETAILS

FIGURE 38

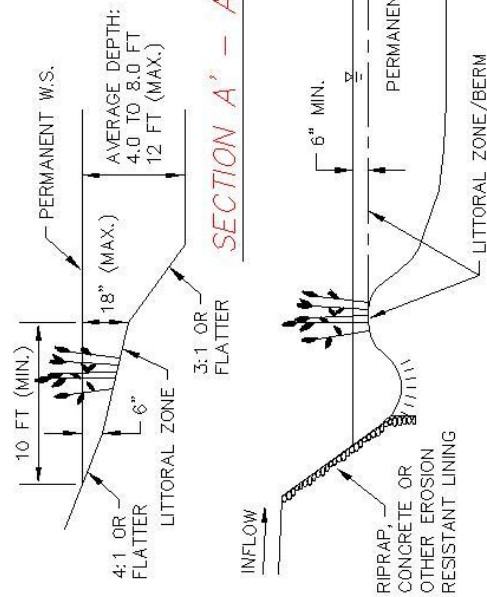


ADAPTED FROM DENVER URBAN DRAINAGE & FLOOD CONTROL DISTRICT — DRAINAGE CRITERIA MANUAL



PLAN

NOT TO SCALE



SECTION

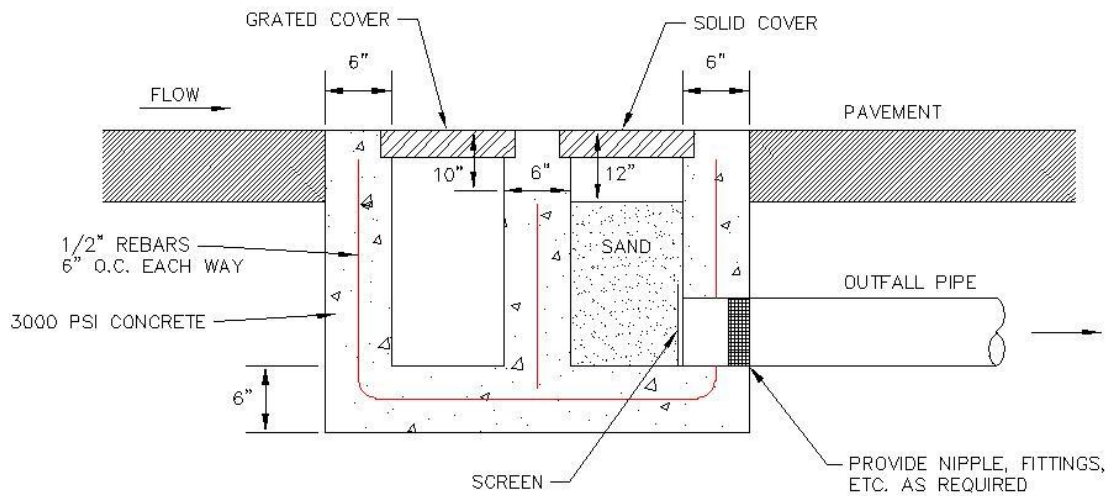
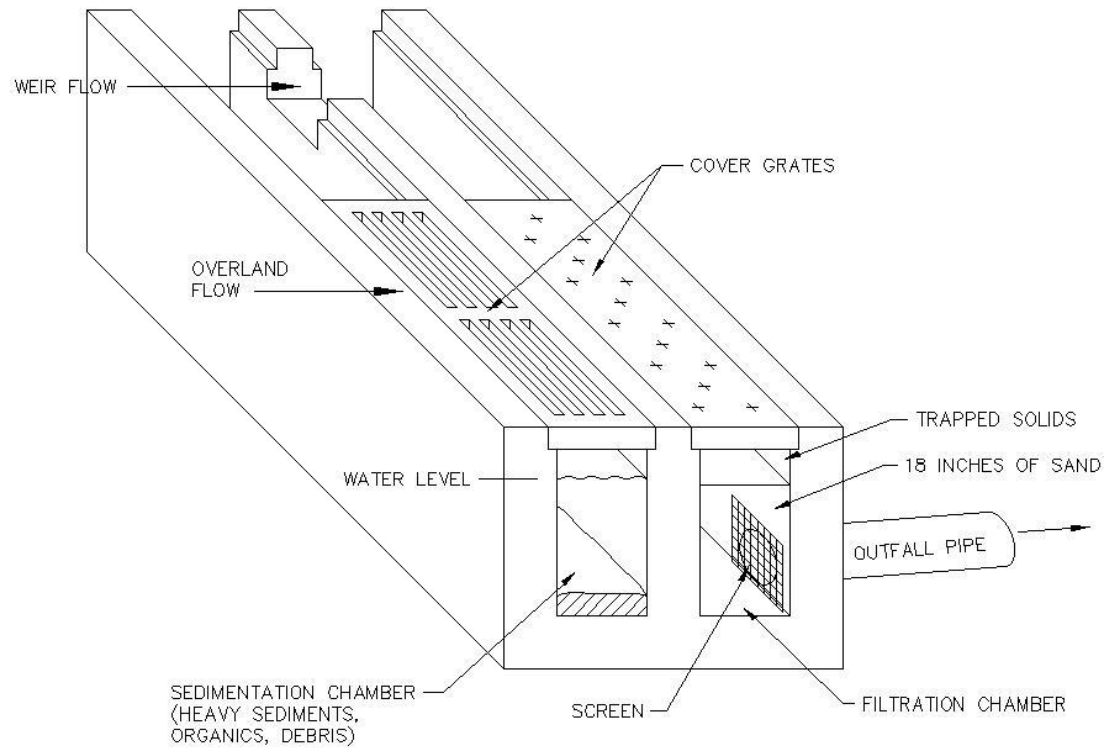
NOT TO SCALE



City of Carterville, Missouri  
STORMWATER MANAGEMENT CRITERIA

WET EXTENDED DETENTION BASIN TYPICAL DETAILS

FIGURE 39



FROM: EPA 1992



*City of Carterville, Missouri*  
STORMWATER MANAGEMENT CRITERIA

SAND FILTER  
SCHEMATIC

FIGURE 40



APPENDIX **MCM 5**

POST-CONSTRUCTION  
STORMWATER MANAGEMENT

CHECKLISTS AND  
SUPPORTING DOCUMENTS

AN ORDINANCE APPROVING AMENDMENTS TO THE CITY CODE.  
BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF CARTERVILLE,  
MISSOURI, AS FOLLOWS:

SECTION 1. THAT THE CITY ADOPT THE FOLLOWING POST-CONSTRUCTION  
STORMWATER CODES TO BE INCORPERATED INTO CHAPTER 250 OF THE CITY  
CODE.

#### INTRODUCTION AND PURPOSE

Increased impervious area and compacted soils due to development can endanger water resources by increasing flow volumes in streams, causing stream degradation and downstream flooding, and by reducing water quality. The function of permanent stormwater controls is to reduce the negative effects of development. Permanent stormwater controls must be maintained to remain effective. The purpose of this ordinance is to safeguard persons, protect property, and prevent damage to the environment in Carterville by establishing legal authority to carry out all inspection and work necessary to ensure compliance with this Article.

#### DEFINITIONS

For the purposes of this Article, the following shall mean:

*Best Management Practice (BMP):* A structural or non-structural measure, facility or activity that helps to achieve stormwater management control objectives at a designated site.

*Erosion and Sediment Control Plan:* A set of plans prepared by or under the direction of a licensed professional engineer. Indicating the specific measures and sequencing to be used to control sediment and erosion on a land disturbance site during and after construction.

*Grading Permit:* A permit issued by the City of Carterville for the construction or alteration of ground, improvements and structures for the control of erosion, runoff, and grading.

*Site:* A parcel of land or a contiguous combination thereof, where grading work is performed as a single unified operation.

#### APPLICABILITY

This Article shall apply to all entities requiring a Grading Permit from the City of Carterville whose approved plans contain permanent stormwater BMPs, unless

explicitly exempted by the City of Carterville. Refer to Section 425.050 for Grading Permit applicability.

## RESPONSIBILITY OF ADMINISTRATION.

The City of Carterville shall administer, implement, and enforce the provisions of this Article. Any powers granted or duties imposed upon the authorized enforcement agency may be delegated in writing by the administrator of the authorized enforcement agency to persons or entities acting in the beneficial interest of or in the employ of the agency.

## SEVERABILITY

The provisions of this Article are hereby declared to be severable. If any provisions, clause, sentence, or paragraph of this Article or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this Article.

## ULTIMATE RESPONSIBILITY

The standards set forth herein and promulgated pursuant to this Article are minimum standards; therefore this Article does not intend nor imply that compliance by any person will ensure that there will be no increase in flow volumes in streams, stream degradation, downstream flooding, or reduction in water quality.

## MAINTENANCE OF BMPS

- A. For any site requiring a Grading Permit, all stormwater BMPs (structural and non-structural) shall be maintained according to the measures outlined in the most recent version of the City of Carterville Stormwater Management Criteria, and as per approved plans, maintenance agreement, and maintenance plan.
- B. The person(s) or organization(s) responsible for maintenance shall be designated in the plans and any maintenance plans and/or covenants.
- C. Any maintenance agreement or maintenance plan shall specify responsibilities for financing maintenance.
- D. Any maintenance agreement or maintenance plan shall be binding upon subsequent owners of the permanent stormwater BMPs.
- E. If maintenance activities are not completed in a timely manner, or as specified in the plans, any maintenance plan and/or maintenance agreement or covenant, the City of Carterville may complete the necessary maintenance at the owner's/operator's expense.

## INSPECTION.

A. Applicability. This section applies to all entities requiring a Grading Permit from the City of Carterville whose approved plans contain permanent stormwater BMPs, unless explicitly exempted by the City of Carterville.

### B. Access to Facilities.

1. The City of Carterville shall be permitted to enter and inspect facilities subject to regulation under this Article as often as may be necessary to determine compliance with this Article. If a site has security measures in force which require proper identification and clearance before entry into its premises, the site owner shall make the necessary arrangements to allow access to representatives of the City of Carterville.

2. Facility operators shall allow the City of Carterville ready access to all parts of the premises for the purposes of inspection, examination and copying of records, performance of maintenance work, and the performance of any additional duties as defined by state and federal law.

3. Any temporary or permanent obstruction to safe and easy access to the facility for purposes of inspection or performing maintenance work shall be promptly removed by the operator at the written or oral request of the City of Carterville and shall not be replaced. The costs of clearing such access shall be borne by the operator.

4. Unreasonable delays in allowing the City of Carterville access to facility are a violation of this Article.

5. If the City of Carterville has been refused access to any part of the premises containing permanent stormwater BMPs, and he/she is able to demonstrate probable cause to believe that there may be a violation of this Article, or that there is a need to inspect and/or perform maintenance work as part of a routine inspection program designed to verify compliance with this Article or any order issued hereunder, or to protect the overall public health, safety, and welfare of the community, then the City of Carterville may seek issuance of a search warrant from any court of competent jurisdiction.

## NOTIFICATION OF VIOLATION.

Whenever the City of Carterville finds that a person has violated a prohibition or failed to meet a requirement of this Article, the City of Carterville may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:

1. The performance of monitoring, analyses, and reporting;
2. The performance maintenance work;
3. The violating practices, or operations shall cease and desist;

4. Payment of a fine to cover administrative and remediation costs; and
5. Implementation of source control or treatment BMPs.

If maintenance work is required, the notice shall set forth a deadline within which such work must be completed. Said notice shall further advise that, should the violator fail to perform the work with the established deadline, the work will be done by the City, a designated agency or a contractor and the expense thereof shall be charged to the violator.

#### APPEAL OF NOTICE OF VIOLATION.

Any person receiving a Notice of Violation may appeal the determination of the City of Carterville. The notice of appeal must be received within ten (10) days from the date of the Notice of Violation. Hearing on the appeal before the appropriate authority or his/her designee shall take place within fifteen (15) days from the date of receipt of the notice of appeal. The decision of the municipal authority or their designee shall be final.

#### ENFORCEMENT MEASURES AFTER APPEAL.

If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or, in the event of an appeal, within ten (10) days of the decision of the municipal authority upholding the decision of the authorized enforcement agency, then representatives of the authorized enforcement agency shall enter upon the subject private property and are authorized to take any and all measures necessary to abate the violation and/or restore the property. It shall be unlawful for any person, owner, agent of person in possession of any premises to refuse to allow the City of Carterville or designated agent or contractor to enter upon the premises for the purposes set forth above.

#### COST OF ABATEMENT OF THE VIOLATION.

Within 30 days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs. The property owner may file a written protest objecting to the amount of assessment within 10 days. If the amount due is not paid within a timely manner, determined by the decision of the municipal authority or by the expiration of the time in which to file an appeal, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment. Any person violating any of the provisions of this article shall become liable to the city by reason of such violation. The liability shall be paid in not more than 12 equal payments. Interest at the rate of percent per annum shall be assessed on the balance beginning on the 1<sup>st</sup> day following the discovery of the violation.

#### INJUNCTIVE RELIEF.

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this Article. If a person has violated or continues to violate the provisions of this Article, the City of Carterville may petition for a preliminary or

permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

**VIOLATIONS DEEMED A PUBLIC NUISANCE.**

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Article is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated, or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

**CRIMINAL PROSECUTION.**

Any person that has violated or continues to violate this Article shall be liable to criminal prosecution to the fullest extent of the law, and shall be subject to criminal penalty of \$500.00 dollars per violation per day and/or imprisonment for a period of time not to exceed 30 days.

The City of Carterville may recover all attorneys' fees court costs and other expenses associated with enforcement of this Article, including sampling and monitoring expenses.

**REMEDIES NOT EXCLUSIVE.**

The remedies listed in this Article are not exclusive of any other remedies available under any applicable federal, state, or local law and it is within the discretion of the City of Carterville to seek cumulative remedies.

**ADOPTION OF ARTICLE.**

This Article shall be in full force and effect immediately after its final passage and adoption. All prior ordinances and parts of ordinances in conflict with this Article are hereby repealed.

**Section 2. That the Mayor is hereby authorized and directed to execute said Ordinance by and on behalf of the City of Carterville.**

Passed by the City Council of the City of Carterville, Missouri this 12<sup>th</sup> day of March, 2024

Attest:

Deborah S. Cornell  
City Clerk

City of Carterville  
By: Alan Duffin  
Mayor

# APPENDIX MCM 6

## POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

### SUPPORTING DOCUMENTS

# Operation and Maintenance (O&M) Manual

for:

*Carterville City Buildings and Grounds Department*





**Buildings and Grounds Department  
Operation and Maintenance (O&M) Manual**

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## **Buildings and Grounds Department Operation and Maintenance (O&M) Manual**

### **I. Introduction**

This manual is designed to assist Carterville City personnel on how to properly implement Best Management Practices (BMP's) on City owned facilities and field activities as part of the municipal stormwater management program.

This manual will identify the potential pollutants and activities that can contribute to the pollution of storm waters as well as the BMP's used to ensure that the potential for these pollutants affecting storm water is diminished to the maximum extent practicable.

### **II. Potential Pollutant Sources**

A variety of pollutants are associated with stormwater pollution due to municipal activities including: sediment, nutrients, bacteria and viruses, oxygen demanding substances, oil and grease, metals, toxic pollutants and floatables (Table 1). The impacts of these pollutants on water quality along with a discussion on municipal activities which can potentially contribute to their introduction into stormwater runoff are presented in the following subsections.

- A) Sediment. Sediment is a common component of stormwater, and is considered to be one of the most damaging pollutants in Missouri. Sediment fills in streams, lakes, rivers, wetlands and road drainage ditches, and can affect aquatic life by smothering fish larvae and eggs. Suspended soil particles can cause water to look cloudy or turbid. Excessive turbidity reduces light penetration in the water, impairing the sight of feeding fish; clogs fish fills, and increases drinking water treatment costs. Fine sediment also acts as a vehicle to transport other pollutants including nutrients, trace metals and hydrocarbons to nearby surface waters. Significant sediment-borne pollutants are associated with highway runoff; originating from pavement wear, vehicles and other road maintenance. Other sources of sediment include erosion from new development and construction sites.
- B) Nutrients- nutrients, especially nitrogen and phosphorus, can cause algae blooms and excessive aquatic plant growth in water bodies. These conditions can impair many important uses of these waters, including recreation, fish habitat, and water supply. Nitrogen and phosphorus associated with stormwater runoff come mostly from fertilizer application. Phosphorus has also been associated with application of sand and salt of roads. Nutrients are a result of yard debris, garbage, as well as fertilizer and pesticide use.
- C) Metals- Trace metals are a water quality concern because the toxic effects they can have on aquatic life. Metals can also be a health hazard to humans through direct ingestion of contaminated water or through eating contaminated fish. The most common trace metals found in

stormwater runoff in urban areas are lead, zinc, copper, cadmium, nickel and other metal sources originating from body rust, brake lining wear steel highway structures, tire wear, steel fabrication and vehicle maintenance.

- D) Oxygen-demanding substances- oxygen-demanding substances tend to deplete the dissolved oxygen levels in streams and lakes. The depleted oxygen supply can result in the reduction of aquatic life. Oxygen-demanding substances are found in yard waste (such as leaves and lawn clippings), animal wastes, street litter and organic matter.
- E) Bacteria and Viruses- bacteria and viruses are the most common microorganisms found in surface water runoff. Bacteria and viruses often carry diseases which can be transferred to animal life and to humans. The main sources of these contaminants are animal excrement and sanitary sewer overflows.
- F) Oil, Grease and Hydrocarbons- oil grease and hydrocarbons contain a wide array of compounds, some of which are toxic to aquatic organisms at low concentrations. The main sources of oil and grease are leakage from engines and waste oil disposal. Hydrocarbons typically come from spills, leaks, lubricants and asphalt surface leachate. Hydrocarbon levels are highest from parking lots, roads and service stations.
- G) Floatables- floatables (garbage) are pollutants that may be contaminated with heavy metals, pesticides and bacteria. Typically resulting from street refuse or industrial yard waste, floatables also create an eye sore in water ways and detention basins.

<b>Pollutant</b>	<b>Source</b>	<b>Impacts</b>
<b>Sediment</b>	Construction sites, vehicle/boat washing, agricultural sites	Destruction of aquatic habitat for fish and plants, transportation of attached oils, nutrients and other chemical contamination, increased flooding. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.
<b>Nutrients (Phosphorus, Nitrogen Potassium, Ammonia)</b>	Fertilizers from agricultural operations, lawns and gardens; livestock and pet waste, decaying grass and leaves, sewer overflows and leaks.	Harmful algal blooms, reduced oxygen in the water, changes in water chemistry and pH. Nutrients can result in excessive or accelerated growth of vegetation, resulting in impaired use of water in lakes and other receiving waters.
<b>Hydrocarbons (Petroleum Products, Benzene, Toluene, Ethyl benzene, Xylene)</b>	Vehicle and equipment fluid leaks, engine emissions, pesticides, equipment cleaning, leaking fuel storage containers, fuel spills, parking lot runoff	These pollutants are toxic to humans and wildlife at very low levels. Carcinogenic. Teratogenic.
<b>Heavy Metals</b>	Vehicle brake and equipment wear, engine emissions, parking lot runoff, batteries, paint and wood preservatives, fuels and fuel additives, pesticides, cleaning agents	Metals including lead, zinc, cadmium, copper, chromium and nickel are commonly found in stormwater. Metals are of concern because they are toxic to all life at very low levels. Carcinogenic. Teratogenic.
<b>Toxic Chemicals (Chlorides)</b>	Pesticides, herbicides, dioxins, PCBs, industrial chemical spills and leaks, deicers, solvents,	Chemicals are of concern because they are toxic to all life at very low levels. Carcinogenic. Teratogenic.
<b>Debris/Litter/Trash</b>	Improper solid waste storage and disposal, abandoned equipment, litter	Aesthetically unpleasant. Risk of decay product toxicity. Risk of aquatic animal entrapment or ingestion and death.
<b>Pathogens (Bacteria)</b>	Livestock, human, and pet waste, sewer overflows and leaks, septic systems	Human health risks due to disease and toxic contamination of aquatic life.

**Table 1** Potential pollutants of concern associated with municipal activities.

Sources of Pollution	Primary Pollutant	Nutrients	Heavy Metals	pH (acids and bases)	Pesticides & Herbicides	Oil & Grease	Bacteria & Viruses	Trash, Debris, Solids	Other toxic Chemicals
	Sediment								
Clearing, grading, excavating, and un-stabilized areas	√							√	
Paving operations	√					√		√	
Concrete washout, stucco and cement waste			√	√				√	
Structure construction, painting, cleaning			√	√				√	√
Demolition and debris disposal	√							√	
Material Delivery and storage	√	√	√	√		√		√	√
Solid waste disposal								√	√
Hazardous Waste, contaminated spills			√	√	√	√			√
Sanitary waste		√		√			√		
Vehicle/equipment fueling, maintenance, use and storage						√		√	√
Landscaping operations	√	√			√			√	√
Vehicle washing ( <b>Not allowed at this location</b> )									

### III. Facilities Locations, Activities and Control Measures

#### 1. City Operations Compound (High priority)

**Location-** Located at 310 South Tennessee is shared with the Water, Streets, Sewer, and Fleet Departments.

**Activities-** The compound is used for employee and equipment parking, storage of equipment attachments, new park equipment (benches, pick nick tables, sign posts, etc), pipe and wood. The buildings are used for the mower, supplies storage and small engine service and repairs. The most common supplies stored in the building are:

paint thinner	fertilizer	propane
solvent	snow and ice melt	pipe glue
vehicle fluids	paint	spray paint
equipment spare parts	gasoline	grease
	oil	

#### Control Measures SOPs

Good House Keeping. Good housekeeping practices offer a practical and cost-effective way to maintain a clean and orderly facility to prevent potential pollution sources from coming into contact with storm water. Good housekeeping practices also help to enhance safety and improve the overall work environment.

- Indoor work areas will be kept clean and organized.
- Outdoor storage areas will be maintained clean and organized.
- Trash and litter are to be picked up from work areas daily. All trash is to be disposed of in approved dumpsters on site, make sure the dumpster lids are closed.
- The yard will be walked to pick up and dispose of litter weekly
- Fuel, oil, fertilizers, herbicides, paint, solvents and other chemicals will be stored indoors neatly organized; containers must be properly labeled, hazardous chemicals will be stored in a locked container.
- Concrete wash out activities are not allowed at this facility.

#### Vehicle and Equipment Parking Areas

- Vehicles and equipment will be parked on the approved designated areas
- If any leaks are discovered, a drip pan will be used to collect the fluids and vehicle will be scheduled for repairs.

- Any leaks or spills that do wind up on the pavement will be cleaned using dry methods (absorbent material, sweep when dry and dispose in the garbage can)

#### Vehicle and Equipment Cleaning Areas

- No washing is allowed outdoors.
- There are no wash facilities at this location. All major washing is done at:
  - City of Webb City commercial car wash locations
- Minor washing is done inside the shop where floor drains go to the sanitary sewer.

#### Vehicle and Equipment Maintenance Areas

- All major repairs and maintenance activities are conducted at the City Shop located at this facility.
- Activities such as adding oil to engines, transmissions and differentials are done indoors.
- Oils and other automotive fluids are neatly and cleanly stored. Secondary containment will be used under the used oil container and other bulk oil containers.
- Equipment that is stored outside will be inspected to make sure that all drips are contained and/or repaired.

#### Mower and Small Equipment Maintenance

- Equipment will be kept in good operating and clean conditions.
- Mowing, trimming, edging equipment will be cleaned using high pressure air or manual devices when possible. Debris from such cleaning will be swept and disposed of in proper waste container.
- Mowing, trimming, or edging equipment may be hosed off on grass areas as long as no detergents or solvents are used in the process. All debris from such cleaning must remain on grass or be deposited into a proper waste container.
- All other cleaning will take place in specified and approved equipment cleaning wash bay that drains to the sanitary sewer.
- Equipment should be kept free from leaks of any sort. All leaks will be caught in a catch pan or have absorbent materials applied. Caught items will be properly disposed of at a materials reclamation area. Absorbent materials will be disposed of in a proper waste container.
- Blade Sharpening, grinding activities- floors are swept after project has been completed.
- All used oil and other vehicle fluids are collected in 5 gallon containers labeled used oil and are taken to the Carterville Fleet Department to be recycled.
- Oil filters are drained into the used oil collection container and after 24 hours of draining time they are placed in the dumpster.

## 2. Parks

### Locations.

Comet Park	400 West Main	12 acres
Garrett Park	600 North Pine 12	16 acres
City Hall Park	1200 East 1st	3 acres

### Activities

- Mowing Grass
- Fertilizer application
- Herbicide treatment
- Facilities clean up and maintenance (bathrooms, parking lots, etc)
- Garbage collection
- Mulching

### Control Measures SOPs

#### Lawn Mowing and/or trimming

- Mowing/trimming operations will occur weekly, twice weekly, or as necessary at each location.
- All mowing/trimming equipment will be properly fueled at a proper fueling location. Any spilled fuels will have absorbent materials applied to absorb them. Absorbent materials will be disposed of in a proper trash container.
- Mowers will have mulching type decks that are kept in good repair with all guards and deflectors in place.
- Trimmers will have all deflectors in place and in good repair.
- All materials resulting from mowing/trimming operations should remain on grass.
- Trimmings that are found on hard surfaces will be blown or swept back on to the grass.
- Trimmings that cannot be swept or blown back on to grass will be swept and deposited into appropriate waste container.



### Fertilizer application

- City will order and consume fertilizer as needed. Generally fertilizer will not be stored.
- If fertilizer is stored, it will be inside of a building.
- Fertilizer will be applied once or twice annually as needed.
- All fertilizer applications will be supervised by a Certified Pesticide Applicator.
- Fertilizer will be applied in accordance to manufacturer's instructions.
- Fertilizer will be transported to site in bags.
- Fertilizer spreaders will be filled at the site where the use is intended.
- Bags will be opened individually and dumped into spreader.
- Any spilled fertilizer will be swept and returned to spreader or spread on grass.
- Fertilizer that lands on hard surfaces will be swept or blown back onto grass.
- Fertilizer bags will be disposed of in a proper waste container.
- Any errant fertilizer found in vehicle will be swept and spread on grass.

### Herbicide/Pesticide Application

- Will be purchased and consumed as needed. Minimal pesticides will be stored.
- Stored product will be kept in a separate cabinet with locked doors.
- Product applications will be supervised by a Certified Applicator.
- Product will be mixed and applied according to manufacturer's directions.
- Product will be applied as needed when weather conditions allow.
- Appropriate PPE will be worn when mixing and applying products.
- Product will be mixed in an area and manner to avoid spillage.
- If a spill occurs, absorbent materials will be applied to spill. Absorbent materials will be disposed of in appropriate waste container.
- Empty product containers will be disposed of in appropriate waste containers.
- Product sprayers will be secured in vehicles when transported.
- All mixed products will be applied to plants or other appropriate locations. Surplus materials may not be deposited into storm drain or sanitary sewer.

### Restroom Maintenance

- All restrooms will be cleaned in accordance to minimum acceptable standards.
- Restroom floors will be swept. Swept materials will be collected and disposed of in a proper waste container.
- Restroom floors and walls may be hosed. All water from such activities must drain into the sanitary sewer, or onto landscaped areas. No such water may enter the storm drain.

- Restroom floors will be mopped. All water from such activities will be put into the sanitary sewer or dumped onto landscaped areas. No such water shall be allowed to enter the storm drain.
- All cleaning chemicals shall be used in accordance to manufacturer's specifications.
- Cleaning chemicals shall be mixed in accordance to SOP for cleaning chemicals.
- Weekly visual inspections and repaired problems will be logged on the appropriate reports located on the appendices section of this manual.

#### Pavilion Cleaning and Maintenance

- Pavilions will be cleaned as necessary to accommodate reservations or to maintain minimum acceptable standards.
- Pavilions may be blown off. All trash and debris shall be collected and deposited into an appropriate waste container.
- Pavilions may also be hosed or pressure washed. All water resulting from such activities must go onto landscaped areas. No such water may enter the storm drain.
- Any debris resulting from hosing or pressure washing shall be collected and deposited into an acceptable trash container.
- Weekly visual inspections and repaired problems will be logged on the appropriate reports located on the appendices section of this manual.

#### Sidewalks, Parking Lots, and Trails in and around Parks and Public Facilities.

- Parking lots will be swept by Public Works annually or as needed.
- Trails and sidewalks will be kept free of debris as necessary.
- Trails and sidewalks will be blown off as needed. Debris will be blown onto grass or planted areas.
- Curbs and gutters around parking lots will be blown out or swept as needed. Debris will be blown onto grass or planted areas when possible. When not possible, debris will be collected and deposited into proper waste container.
- Garbage and other debris will be removed from catch basins.
- Weekly visual inspections and repaired problems will be logged on the appropriate reports located on the appendices section of this manual.

#### Snow Melt/ Road Salt storage and use

- All snow melt materials will be kept in bags and stored in a storage building until they are consumed.
- Road salts will be stored in a proper road salt storage location. Road salts will be stored in a manner to be protected from storms and to allow minimal dissolving of salts.
- Snow melt and road salt materials will be loaded into spreading devices as needed and as can be consumed. Materials will not remain in spreading devices if unused. Unused road salts will be returned to stockpile.
- Snow melt and road salts will be applied to parking lots and walkways as needed using minimal necessary materials. Materials may be reapplied only as needed for public safety.

- Any spillage of snow melt material or road salts will be returned to the spreading device and applied to appropriate areas. Spilled materials may also be swept and deposited in appropriate waste container.
- Snow melt or road salts that are not dissolved will be blown or swept of parking lots or walkways as needed. Removed materials will either be blown to landscaped areas or collected and deposited in an appropriate waste container.
- Snow removal equipment is washed at the waste water facility drying beds.

### **3. Field Activities and Control Measures**

#### **Activities and Control Measures**

- Tree removal or pruning as needed- All tree removal materials are ground up and hauled to green waste facility, all debris from the work area are cleaned up by the end of each work day.
- Plant trees- trees are planted through out the year; a back hoe is used to excavate the holes, trees are brought in to the work area on a flat bed trailer or truck, street and gutters are swept by the end of each work day.
- Sprinkler repair- is an as needed activity, any dirt that is placed on the street, gutters or parking lot will be removed from these hard surfaces by the end of each work day.
- Snow removal of City facilities sidewalks and parking lots. Salt and de-icing chemicals are used in limited amounts any over application gets cleaned up.

#### **Other Control Measures**

Good house keeping. Pick up garbage from the work sites, sweep work areas after work is completed.

Material management; keep stock piled materials from entering the storm drain system.

#### 4. Spill Prevention and Response Procedures

<b>Hazardous Material</b>	<b>Location of Spill</b>	<b>Reportable Quantity</b>
Gasoline, Diesel Fuel and Oils	Land/Water	25 gallons or visible sheen

Each facility, work area or service vehicle has a spill response kit. Most spills can be cleaned up following the product manufacturer recommendations or for liquid spills using absorbent/oil dry materials. Absorbent/oil dry, sealable containers, plastic bags, and shovels/brooms are suggested minimum spill response kit.

- 1<sup>st</sup> Priority: Protect all people
- 2<sup>nd</sup> Priority: Protect equipment and property
- 3<sup>rd</sup> Priority: Protect the environment

1. Make sure the spill area is safe to enter and that it does not pose an immediate threat to health or safety of any person.
2. Stop the spill source
3. Check for hazards (flammable material, noxious fumes, cause of spill) – if flammable liquid, turn off engines and nearby electrical equipment. If serious hazards are present leave area and call 911. LARGE SPILLS ARE LIKELY TO PRESENT A HAZARD.
4. Call co-workers and supervisor for assistance and to make them aware of the spill and potential dangers
5. If possible, stop spill from entering drains (use absorbent or other material as necessary)
6. Stop spill from spreading (use absorbent or other material)
7. If spilled material has entered a storm sewer; contact the City Storm Water Department.
8. Clean up spilled material according to manufacturer specifications, for liquid spills use absorbent materials and do not flush area with water.
9. Properly dispose of cleaning materials and used absorbent material according to manufacturer specifications.

#### Emergency Numbers

Carterville City Fire Department	417 673 3070
Carterville City Police Department	417 673 2616
Carterville City Storm Water Collections	417 673 1341

## **5. Inspections**

Personnel from the Public Works Department will conduct inspections of the assigned areas and document with the appropriate report. Inspection reports and logs are located on the appendices section of this manual.

- Weekly visual inspections for:
  - Parks (include buildings and parking lots).
  - Buildings and parking lots.
  
- Annual Comprehensive Inspections for:
  - City Operations Compound

Weekly visual inspections will be tracked in the log attached on appendix F, annual comprehensive inspections will be documented on appendix G; spills will be cleaned up immediately and documented on a spill report located on appendix D.

Deficiencies will have to be corrected within one week of being reported. All inspections and follow up actions will be documented and kept within this O&M Manual. Corrective Action Log Appendix E

## **6. Employee Training**

All employees will receive training regarding this O&M Manual at least annually. The training will cover the following subjects:

- Impacts associated with illicit discharges;
- Proper disposal and management of wastes;
- Proper maintenance of indoor and outdoor working areas including parking lot surfaces;
- Spill response; and
- Inspections training.

# Appendix A

## Site Maps



## **Appendix B**

### **BMPs Specifications and Detail Sheets**





**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Area control procedures involve practicing good housekeeping measures such as maintaining indoor or covered material storage and industrial processing areas. If the area is kept clean, the risk of accumulating materials on footwear and clothing is reduced. In turn, the chance of left over pollutants making contact with stormwater polluting surface water is minimized.

**APPROACH:**

Area control procedures can be used at any facility where materials may be tracked into areas where they can come in contact with stormwater runoff. Areas can include material handling areas, storage areas, or process areas.

Effective practices include the following:

- Cover garments, foot mats, and other devices used to collect residual material near the area should be cleaned regularly.
- Brush off clothing before leaving the area.
- Stomp feet to remove material before leaving the area.
- Use floor mats at area exits.
- Use coveralls, smocks, and other overgarments in areas where exposure to material is of greatest concern (employees should remove the overgarments before leaving the area).
- Post signs to remind employees about these practices.

**LIMITATIONS:**

May be seen as tedious by employees and therefore may not be followed.

**MAINTENANCE:**

Materials storage areas and industrial processing areas should be checked regularly to ensure that good housekeeping measures are implemented.



**TARGETED POLLUTANTS**

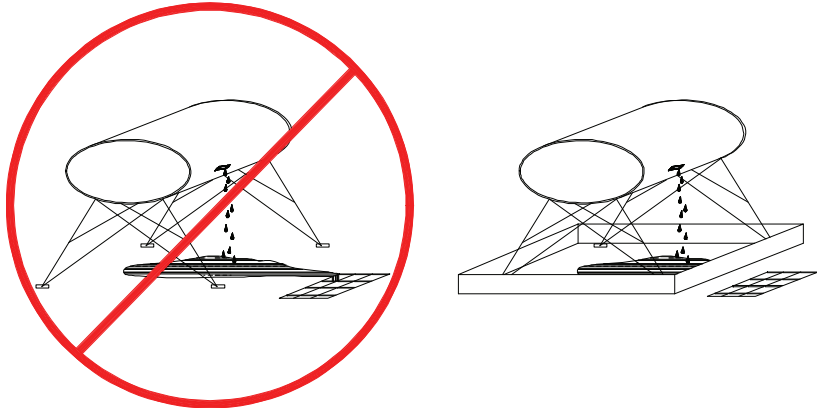
- High Impact
- Medium Impact
- Low or Unknown Impact

- Sediment
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to stormwater from aboveground storage tanks by installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

The most common causes of unintentional releases are:

- Installation problems,
- Failure of piping systems (pipes, pumps, couplings, hoses, and valves),
- External corrosion and structural failure,
- Spills and overfills due to operator error, and
- Leaks during pumping of liquids or gases from truck to a storage tank or vice versa.

**APPROACH:**

- Integrate efforts with existing aboveground petroleum storage tank programs through the local Fire Department and Health Department, and area and business emergency response plans through the City, County, or Fire District.
- Use engineering safeguards to reduce the chance for spills.
- Perform regular maintenance.

**LIMITATIONS:**

For larger spills, a private spill clean-up company or Hazmat team may be necessary.

**MAINTENANCE:**

Maintenance is critical to preventing leaks and spills. Conduct routine weekly inspections and:

- Check for external corrosion and structural failure,
- Check for spills and overfills due to operator error,
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves),
- Check for leaks or spills during pumping of liquids or gases from truck to storage facility or vice versa.
- Periodically, integrity testing should be conducted by a qualified professional.



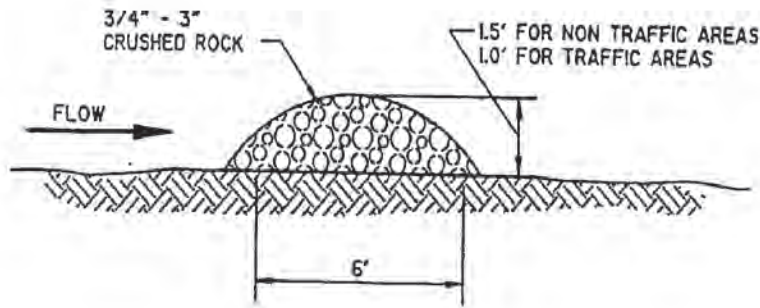
**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact
- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

■ High    • Medium    • Low



**DESCRIPTION:**

A rock filter is made of rock 3/4 - 3" in diameter and placed along a level contour. A brush filter is composed of brush (usually obtained during the site clearing) wrapped in filter cloth and anchored to the toe of the slope. If properly anchored brush or rock filters may be used for sediment trapping and velocity reduction.

**APPLICATION:**

- As check dams across mildly sloped construction roads.
- Below the toe of slopes.
- Along the site perimeter.
- In areas where sheet or rill flow occurs.
- Around temporary spoil areas.
- At sediment traps or culvert/pipe outlets.

**INSTALLATION/APPLICATION CRITERIA:**

- For rock filter, use larger rock and place in a staked, woven wire sheathing if placed where concentrated flows occur.
- Install along a level contour.
- Leave area behind berm where runoff can pond and sediment can settle.
- Drainage areas should not exceed 5 acres.

**LIMITATIONS:**

- Rock berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Runoff will pond upstream of the filter, possibly causing flooding if sufficient space does not exist.

**MAINTENANCE:**

- Inspect monthly after each rainfall.
- If berm is damaged, reshape and replace lost/dislodged rock.
- Remove sediment when depth reaches 1/3 of berm height, or 1 ft.

**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact

- **Sediment**
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices



**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to stormwater from buildings and grounds maintenance by washing and cleaning up with as little water as possible, preventing and maintaining the stormwater collection system.

Buildings and grounds maintenance includes taking care of landscaped areas around the facility, cleaning of parking lots and pavement other than in the area of industrial activity, and the cleaning of the storm drainage system.

**APPROACH:**

- Preserve existing native vegetation to reduce water, fertilizer, and pesticide needs.
- Carefully use pesticides and fertilizers in landscaping.
- Integrate pest management where appropriate.
- Sweep paved surfaces.
- Clean the storm drainage system at appropriated intervals.
- Properly dispose of wash water, sweepings, and sediments.

**LIMITATIONS:**

Alternative pest/weed controls may not be available, suitable or effective in every case.

**MAINTENANCE:**

The BMPs themselves relate to maintenance and do not require maintenance as they do not involve structures.

**TARGETED POLLUTANTS**

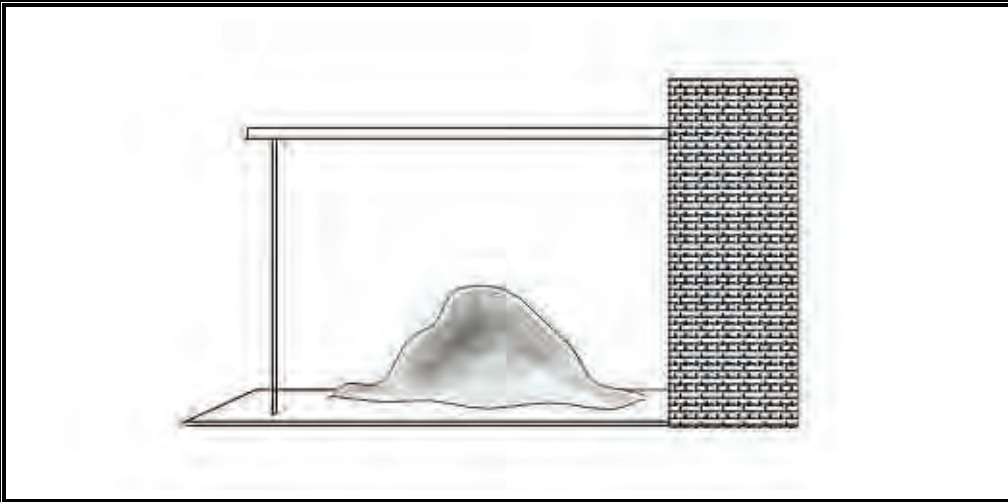
- High Impact
- Low or Unknown Impact
- Medium Impact

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Covering is the partial or total physical enclosure of materials, equipment, process operations, or activities. Covering certain areas or activities prevents stormwater from coming into contact with potential pollutants and reduces material loss from wind blowing. Tarpaulins, plastic sheeting, roofs, buildings, and other enclosures are examples of covering that are effective in preventing stormwater contamination. Covering can be temporary or permanent.

**APPROACH:**

- Covering is appropriate for outdoor material storage piles (e.g., stockpiles of dry materials, gravel, sand, compost, sawdust, wood chips, and de-icing salt) as well as areas where liquids and solids in containers are stored or transferred.
- While it may be too expensive to cover all industrial activities, cover all high-risk areas first (e.g., chemical preparation areas, vehicle maintenance areas, and areas where salts are stored), then according to budget cover the rest of the materials.
- Evaluate the strength and longevity of the covering, as well as its compatibility with the material or activity being enclosed.
- When designing an enclosure, consider access to materials, their handling, and transfer.
- Materials that pose environmental and safety dangers require special ventilation and temperature considerations.
- Covering alone may not protect the materials. When designing, consider placing materials on an elevated, impermeable surface or build curbing around the outside of the materials to prevent problems from runoff of uncontaminated stormwater from adjacent areas.
- Anchor all coverings with stakes, tie-down ropes, large rocks, tires or other easily available heavy objects.

**LIMITATIONS:**

- Requires frequent inspection.
- May pose health or safety problems if enclosure is built over certain activities.

**MAINTENANCE:**

- Frequently inspect coverings for rips, holes and general wear.



**TARGETED POLLUTANTS**

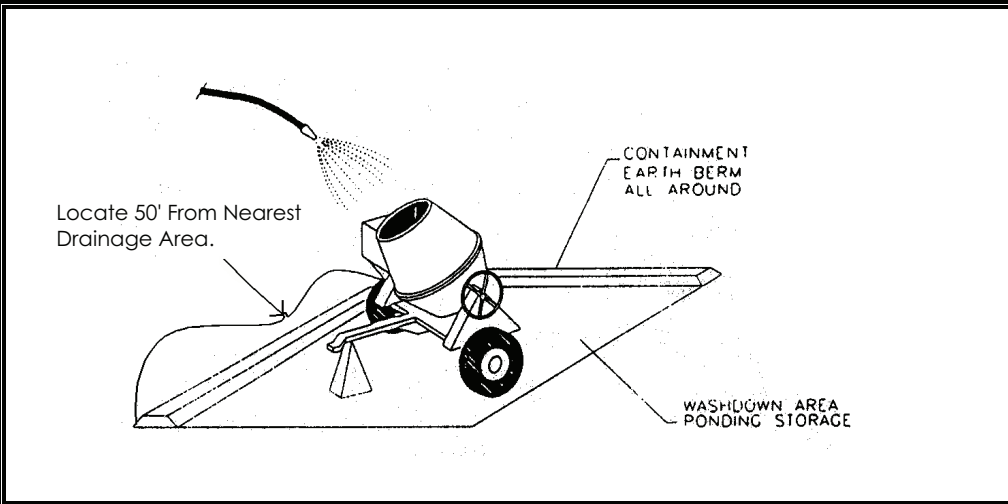
- High Impact
- Medium Impact
- Low or Unknown Impact

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to storm water from concrete waste by conducting washout off-site, performing on-site washout in a designated area, and training employees and subcontractors.

**APPLICATIONS:**

This technique is applicable to all types of sites.

**INSTALLATION/APPLICATION CRITERIA:**

- Store dry and wet materials under cover, away from drainage areas.
- Avoid mixing excess amounts of fresh concrete or cement on-site.
- Perform washout of concrete trucks off-site or in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on-site, except in designated areas.
- When washing concrete to remove fine particles and expose the aggregate, avoid creating runoff by draining the water within a bermed or level area. (See Earth Berm Barrier information sheet.)
- Train employees and subcontractors in proper concrete waste management.

**LIMITATIONS:**

- Off-site washout of concrete wastes may not always be possible.

**MAINTENANCE:**

- Inspect subcontractors to ensure that concrete wastes are being properly managed.
- If using a temporary pit, dispose hardened concrete on a regular basis.

**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact

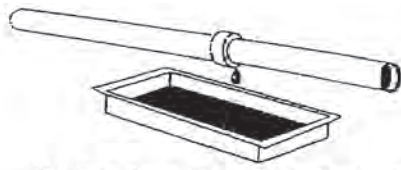
- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

**IMPLEMENTATION REQUIREMENTS**

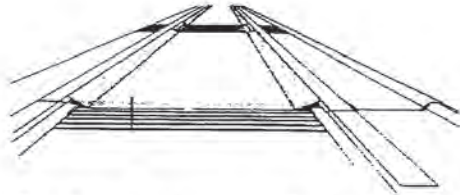
- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low





Use Drip Pans for Leaking Equipment



Use Drip Pans in Loading and Unloading Areas

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Drip pans are small depressions or pans used to contain very small volumes of leaks, drips, and spills that occur at a facility. Drip pans can be depressions in concrete, asphalt, or other impenetrable material. They can be made of metal, plastic, or any material that does not react with the dripped chemicals. Drip pans can be temporary or permanent.

Drip pans are used to catch drips from valves, pipes, etc. so that the materials or chemicals can be cleaned up easily or recycled before they contaminate stormwater. Although leaks and drips should be repaired and eliminated as part of a preventative maintenance program, drip pans can provide a temporary solution where repair or replacement must be delayed. In addition, drip pans can be an added safeguard when they are positioned beneath areas where leaks and drips may occur.

**APPROACH:**

- When using drip pans, consider the location of the drip pan, weather conditions, the type of material used for the drip pan, and how it will be cleaned.
- The location of the drip pan is important. Because drip pans must be inspected and cleaned frequently, they must be easy to reach and remove. However, take special care to avoid placing drip pans where they can be easily overturned or be a safety hazard.
- Secure pans by installing or anchoring them. Drip pans may be placed on platforms, behind wind blocks or tied down.
- Employees must pay attention to the pans and empty them when they are nearly full.
- Frequent inspection of the drip pans is necessary due to the possibility of leaks in the pan itself or in piping or valves that may occur randomly or irregular slow drips that may increase in volume.

**LIMITATIONS:**

- Contain small volumes only.
- Must be inspected and cleaned frequently.
- Must be secured during poor weather conditions.
- Contents may be disposed of improperly unless facility personnel are trained in proper disposal methods.



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**DESCRIPTION:**

Employee training, like equipment maintenance, is a method by which to implement BMPs. Employee training should be used in conjunction with all other BMPs as part of the facility's SWPPP.

The specific employee training aspects of each of the source controls are highlighted in the individual information sheets. The focus of this information sheet is more general, and includes the overall objectives and approach for assuring employee training in stormwater pollution prevention. Accordingly, the organization of this information sheet differs somewhat from the other information sheets in this chapter.

**OBJECTIVES:**

Employee training should be based on four objectives:

- Promote a clear identification and understanding of the problem, including activities with the potential to pollute stormwater;
- Identify solutions (BMPs);
- Promote employee ownership of the problems and the solutions; and
- Integrate employee feedback into training and BMP implementation.

**APPROACH:**

- Integrate training regarding stormwater quality management with existing training programs that may be required for other regulations.
- Employee training is a vital component of many of the individual source control BMPs included in this manual.

**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- High
- Medium
- Low





**DESCRIPTION:**

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals.

**APPROACH:**

- Pattern a new program after the many established programs from municipalities around the country. Integrate this best management practice as much as possible with existing programs at your municipality.
- This BMP has two key audiences: municipal employees and the general public.
- For the general public, municipalities should establish a public education program that provides information on such items as storm water pollution and beneficial effects of proper disposal on water quality; reading product labels; safer alternative products; safe storage, handling, and disposal of hazardous products; list of local agencies; and emergency phone numbers. The programs listed below have provided this information through brochures or booklets that are available at a variety of locations including municipal offices, household hazardous waste collection events or facilities, and public information fairs.

Municipal facilities should develop controls on the application of pesticides, herbicides, and fertilizers in public right-of-ways and at municipal facilities.

Controls may include:

- List of approved pesticides and selected uses.
- Product and application information for users.
- Equipment use and maintenance procedures.
- Record keeping and public notice procedures.

**LIMITATIONS:**

There are no major limitations to this best management practice.

**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
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- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- High
- Medium
- Low



**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

**APPLICATION:**

Many of the chemicals used on-site can be hazardous materials which become hazardous waste upon disposal. These wastes may include:

- Paints and Solvents; petroleum products such as oils, fuels, and grease; herbicides and pesticides; Acids for cleaning masonry; and concrete curing compounds.

In addition, sites with existing structures may contain wastes which must be disposed of in accordance with Federal, State, and local regulations, including:

- Sandblasting grit mixed with lead, cadmium, or chromium-based paints; Asbestos; and PCB's.

**INSTALLATION/APPLICATION CRITERIA:**

The following steps will help reduce storm water pollution from hazardous wastes:

- Use all of the product before disposing of the container.
- Do not remove the original product label, it contains important safety and disposal information.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried off-site by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with Federal and State regulations.

**LIMITATIONS:**

Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.

**MAINTENANCE:**

- Inspect hazardous waste receptacles and area regularly.
- Arrange for regular hazardous waste collection.



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**DESCRIPTION:**

Implement measures to detect, correct, and enforce against illegal dumping of pollutants on streets, into the storm drain system, and into creeks. Substances illegally dumped on streets, into the storm drain system, and into creeks includes paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes can cause storm water and receiving water quality problems as well as clog the storm drain system.

**APPROACH:**

One of the keys to success is increasing the general public's awareness of the problem and to at least identify the incident, if not correct it. There are a number of ways of accomplishing this:

- Train municipal staff from all departments to recognize and report incidents.
- Deputize municipal staff who may come into contact with illegal dumping with the authority to write illegal dumping tickets for offenders caught in the act.
- Educate the public.
- Provide the public with a mechanism for reporting such as a hot line.

Establish system for tracking incidents which will identify:

- Illegal dumping "hot spots",
- Types and quantities (in some cases) of wastes,
- Patterns in time of occurrence (time of day/night, month, or year),
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accident/spills), and
- Responsible parties.

A tracking system also helps manage the program by indicating trends, and identifying who, what, when, and where efforts should be concentrated.

**LIMITATIONS**

The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal.

**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges



**TARGETED POLLUTANTS**

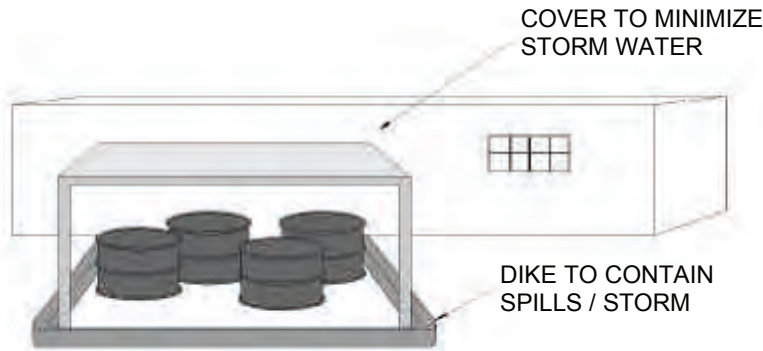
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- Sediment
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- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to stormwater from outdoor container storage areas by installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

**APPROACH:**

Protect materials from rainfall, runoff, and wind dispersal:

- Store materials indoors.
- Cover the storage area with roof.
- Minimize stormwater runoff by enclosing the area or building a berm around it.
- Use a "doghouse" for storage of liquid containers.
- Use covered dumpsters for waste product containers.

Storage of oil and hazardous materials must meet specific federal and state standards including:

- secondary containment,
- integrity and leak detection monitoring, and
- emergency preparedness plans.

Train operator on proper storage.

Safeguards against accidental releases:

- Overflow protection devices to warn operator or automatic shut down transfer pumps, protection guards (bollards) around tanks and piping to prevent vehicle or forklift damage, clear tagging or labeling, and restricting access to valves to reduce human error.

Berm or surround tank or container with secondary containment system:

- Dikes, liners, vaults, or double walled tanks.

Some municipalities require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

**LIMITATIONS:**

Storage sheds often must meet building and fire code requirements.

**MAINTENANCE:**

Conduct routine weekly inspections.



**TARGETED POLLUTANTS**

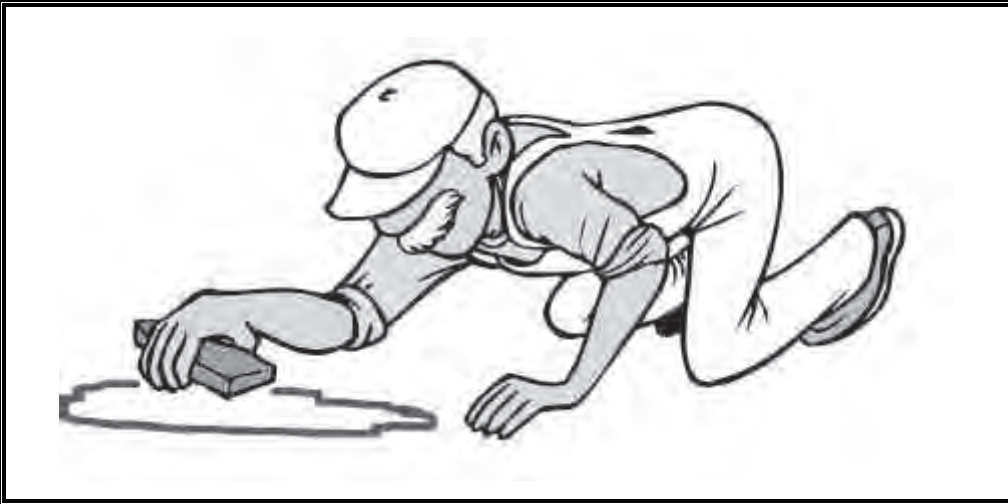
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- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**DESCRIPTION:**

Practices to clean-up leakage/spillage of on-site materials that may be harmful to receiving waters.

**APPLICATION:**

All sites

**GENERAL:**

- Store controlled materials within a storage area.
- Educate personnel on prevention and clean-up techniques.
- Designate an Emergency Coordinator responsible for employing preventative practices and for providing spill response.
- Maintain a supply of clean-up equipment on-site and post a list of local response agencies with phone numbers.

**METHODS:**

- Clean-up spills/leaks immediately and remediate cause.
- Use as little water as possible. NEVER HOSE DOWN OR BURY SPILL CONTAMINATED MATERIAL.
- Use rags or absorbent material for clean-up. Excavate contaminated soils. Dispose of clean-up material and soil as hazardous waste.
- Document all spills with date, location, substance, volume, actions taken and other pertinent data.
- Contact local Fire Department and State Division of Environmental Response and Remediation (Phone #536-4100) for any spill of reportable quantity.

**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion



**TARGETED POLLUTANTS**

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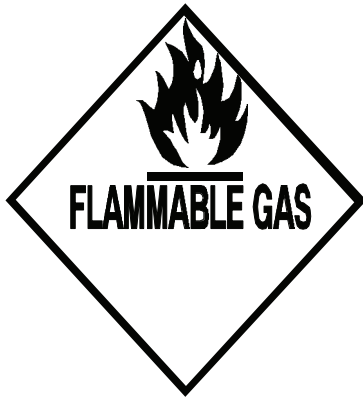
- Sediment
- Nutrients
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- Oil & Grease
- Floatable Materials
- Other Waste

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low





**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Signs and labels identify problem areas or hazardous materials at a facility. Warning signs, often found at industrial facilities, are a good way to suggest caution in certain areas. Signs and labels can also provide instructions on the use of materials and equipment. Labeling is a good way to organize large amounts of materials, pipes, and equipment, particularly on large sites.

**APPROACH:**

Signs and labels can be used at all types of facilities. Areas where they are particularly useful are material transfer areas, equipment areas, loading and unloading areas, or anywhere information might prevent contaminants from being released to stormwater.

Signs and labels should be visible and easy to read. Useful signs and labels might provide the following information:

- Names of facility and regulatory personnel, including emergency phone numbers, to contact in case of an accidental discharge, spill, or other emergency.
- Proper uses of equipment that could cause release of stormwater contaminants.
- Types of chemicals used in high-risk areas.
- The direction of drainage lines/ditches and their destination (treatment or discharge).
- Information on a specific material.
- Refer to OSHA standards for sizes and numbers of signs required for hazardous material labeling.

**LIMITATIONS:**

No limitations.

**MAINTENANCE:**

- Periodic checks can ensure that signs are still in place and labels are properly attached.
- Signs and labels should be replaced and repaired as often as necessary.



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**DESCRIPTION:**

Sorbents are materials that are capable of cleaning up spills through the chemical processes of adsorption and absorption. Sorbents adsorb (an attraction to the outer surface of a material) or absorb (taken in by the material like a sponge) only when they come in contact with the sorbent materials.

Sorbents include, but are not limited to, the following:

- Common materials such as clays, sawdust, straw and fly ash
- Polymers - polyurethane and polyolefin
- Activated Carbon - powdered or granular
- "Universal Sorbent Material" - a silicate glass foam consisting of rounded particles that can absorb the material.

**APPLICATION:**

Sorbents are useful BMPs for facilities with liquid materials onsite.

**INSTALLATION/APPLICATION CRITERIA:**

- Personnel should know the properties of the spilled material(s) to know which sorbent is appropriate. To be effective, sorbents must adsorb the material spilled but must not react with the spilled material to form hazardous or toxic substances.
- Apply immediately to the release area.
- Application is generally simple: the sorbent is added to the area of release, mixed well, and allowed to adsorb or absorb.
- Many sorbents are not reusable once they have been used.
- Proper disposal is required.

**LIMITATIONS:**

- Requires a knowledge of the chemical makeup of a spill (to choose the best sorbent).
- May be an expensive practice for large spills.
- May create disposal problems and increase disposal costs by creating a solid waste and potentially a hazardous waste.

**MAINTENANCE:**

No information available.

**CONSIDERATIONS**

- Soils
- Area Required
- Slope
- Water Availability
- Aesthetics
- Hydraulic Head
- Environmental Side Effects



**TARGETED POLLUTANTS**

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- Medium Impact
- Low or Unknown Impact

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- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to storm water from vehicle and equipment cleaning by using off-site facilities, washing in designated, contained areas only, eliminating discharges to the storm drain by infiltrating or recycling the wash water, and/or training employees and subcontractors.

**INSTALLATION/APPLICATION:**

- Use off-site commercial washing businesses as much as possible. Washing vehicles and equipment outdoors or in areas where wash water flows onto paved surfaces or into drainage pathways can pollute storm water. If you wash a large number of vehicles or pieces of equipment, consider conducting this work at an off-site commercial business. These businesses are better equipped to handle and dispose of the wash waters properly. Performing this work off-site can also be economical by eliminating the need for a separate washing operation at your site.
- If washing must occur on-site, use designated, bermed wash areas to prevent wash water contact with storm water, creeks, rivers, and other water bodies. The wash area can be sloped for wash water collection and subsequent infiltration into the ground.
- Use as little water as possible to avoid having to install erosion and sediment controls for the wash area. Educate employees and subcontractors on pollution prevention measures. Do not permit steam cleaning on-site. Steam cleaning can generate significant pollutant concentrations.

**LIMITATIONS:**

- Sending vehicles/equipment off-site should be done in conjunction with Stabilized Construction Entrance.

**MAINTENANCE:**

- Minimal, some berm repair may be necessary.



**TARGETED POLLUTANTS**

- High Impact
- Medium Impact
- Low or Unknown Impact

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low





## Standard Operating Procedures

### Cleaning Chemicals

- All cleaning chemicals are to be mixed in accordance to manufacturer's directions.
- All cleaning chemicals are to be mixed in an area with adequate ventilation and an area that has a drain that connects to the sanitary sewer.
- If no connection to a sanitary sewer is available, cleaning chemicals are to be mixed on grass or other landscaped area.
- All appropriate PPE shall be work when mixing cleaning chemicals.
- Any spills will be immediately contained with absorbent materials. Absorbent materials will be disposed if in a proper waste container.
- Excess mixed materials will be stored in a properly marked and appropriate container, and in a closed cabinet or storage space. Excess materials should be consumed as soon as possible through appropriate cleaning activities.



## Standard Operating Procedures

### Street Sweeping and Waste Materials

- Sweeper should be routinely inspected to detect hydraulic, oil, and fuels leaks prior to deploying equipment on city streets.
- Sweeper wash tank should only be filled with water and never soaps or solvents. This may damage the tank, sprayers, and contaminate storm drains.
- Immediately following all sweeping operations, waste bins should be emptied at the designated dumpster located at public works.
- Excess waste which will not fit in the designated dumpster may be placed next to the dumpster, however it must be tarped immediately and placed in the dumpster once room is available.



## Standard Operating Procedures

### Equipment Maintenance and Cleaning

- Equipment will be kept in good operating and clean conditions.
- Mowing, trimming, edging equipment will be cleaned using high pressure air or manual devices when possible. Debris from such cleaning will be swept and disposed of in proper waste container.
- Mowing, trimming, or edging equipment may be hosed off on grass areas as long as no detergents or solvents are used in the process. All debris from such cleaning must remain on grass or be deposited into a proper waste container.
- All other cleaning will take place in a specified and approved equipment cleaning wash bay.
- Equipment should be kept free from leaks of any sort. All leaks will be caught in a catch pan or have absorbent materials applied. Caught items will be properly disposed of at a materials reclamation area. Absorbent materials will be disposed of in a proper waste container.



## Standard Operating Procedures

### Fertilizers

- City will order and consume fertilizer as needed. Generally fertilizer will not be stored.
- If fertilizer is stored, it will be inside of a building.
- Fertilizer will be applied once or twice annually as needed.
- All fertilizer applications will be supervised by a Certified Pesticide Applicator.
- Fertilizer will be applied in accordance to manufacturer's instructions.
- Fertilizer will be transported to site in bags.
- Fertilizer spreaders will be filled at the site where the use is intended.
- Bags will be opened individually and dumped into spreader.
- Any spilled fertilizer will be swept and returned to spreader or spread on grass.
- Fertilizer that lands on hard surfaces will be swept or blown back onto grass.
- Fertilizer bags will be disposed of in a proper waste container.
- Any errant fertilizer found in vehicle will be swept and spread on grass.



## Standard Operating Procedures

### Lawn Mowing and/or trimming

- Mowing/trimming operations will occur weekly, twice weekly, or as necessary at each location.
- All mowing/trimming equipment will be properly fueled at a proper fueling location. Any spilled fuels will have absorbent materials applied to absorb them. Absorbent materials will be disposed of in a proper trash container.
- Mowers will have mulching type decks that are kept in good repair with all guards and deflectors in place.
- Trimmers will have all deflectors in place and in good repair.
- All materials resulting from mowing/trimming operations should remain on grass.
- Trimmings that are found on hard surfaces will be blown or swept back on to the grass.
- Trimmings that cannot be swept or blown back on to grass will be swept and deposited into appropriate waste container.



## Standard Operating Procedures

### **Sidewalks, Parking Lots, and Trails in and around Parks and Public Facilities.**

- Parking lots will be swept by Public Works annually or as needed.
- Trails and sidewalks will be kept free of debris as necessary.
- Trails and sidewalks will be blown off as needed. Debris will be blown onto grass or planted areas.
- Curbs and gutters around parking lots will be blown out or swept as needed. Debris will be blown onto grass or planted areas when possible. When not possible, debris will be collected and deposited into proper waste container.
- Weekly visual inspections and repaired problems will be logged on the appropriate reports located on the appendices section of this manual.



## Standard Operating Procedures

### Pavilion Cleaning and Maintenance

- Pavilions will be cleaned as necessary to accommodate reservations or to maintain minimum acceptable standards.
- Pavilions may be blown off. All trash and debris shall be collected and deposited into an appropriate waste container.
- Pavilions may also be hosed or pressure washed. All water resulting from such activities must go onto landscaped areas. No such water may enter the storm drain.
- Any debris resulting from hosing or pressure washing shall be collected and deposited into an acceptable trash container.



## Standard Operating Procedures

### Pesticides

- Pesticides will be purchased and consumed as needed. Minimal pesticides will be stored.
- Stored pesticides will be kept in a separate cabinet with doors.
- Pesticide applications will be supervised by a Certified Pesticide Applicator.
- Pesticide will be mixed and applied according to manufacturer's directions.
- Pesticides will be applied as needed when weather conditions allow.
- Appropriate PPE will be worn when mixing and applying pesticides.
- Pesticides will be mixed in an area and manner to avoid spillage.
- If a spill occurs, absorbent materials will be applied to spill. Absorbent materials will be disposed of in appropriate waste container.
- Empty pesticide containers will be disposed of in appropriate waste containers.
- Pesticide sprayers will be secured in vehicles when transported.
- All mixed pesticides will be applied to plants or other appropriate locations. Surplus materials may not be deposited into storm drain or sanitary sewer.





## Standard Operating Procedures

### Fuel Storage

- Gas and/or deisel fuels will be properly stored only in containers designed for such use.
- Bulk fuel storage will be stored in the elevated tank located at public works.
- Periodic checks should be performed to ensure tank and fittings are in optimum condition and that no leaks are present.
- Bulk storage tanks will be housed withing a secondary containment to catch any leaks or spillage when dispensing.
- Periodic checks should be made to determine if rain water needs to be drained from the secondary containment and may be done so by draining the unit using the removable plug.
- Fueling areas and secondary containment should be observed for issue after rain events to prevent overflow.
- If odor or visual inspection indicates the possibility of cantaminated water in the secondary containment tank, water must be removed and stored in a designate drum for later removal.
- At a minimum, fuel tanks and secondary containments must be thoroughly inspected for damage, rust, and other signs of wear.



## Standard Operating Procedures

### Restroom Maintenance

- All restrooms will be cleaned in accordance to minimum acceptable standards.
- Restroom floors will be swept. Swept materials will be collected and disposed of in a proper waste container.
- Restroom floors and walls may be hosed. All water from such activities must drain into the sanitary sewer, or onto landscaped areas. No such water may enter the storm drain.
- Restroom floors will be mopped. All water from such activities will be put into the sanitary sewer or dumped onto landscaped areas. No such water shall be allowed to enter the storm drain.
- All cleaning chemicals shall be used in accordance to manufacturer's specifications.
- Cleaning chemicals shall be mixed in accordance to SOP for cleaning chemicals.



## Standard Operating Procedures

### Snow Melt/ Road Salt storage and use

- All snow melt materials will be kept in bags and stored in a storage building until they are consumed.
- Road salts will be stored in a tarped, 3-sided storage bin located at public works. Road salts will be stored in a manner to be protected from storms and to allow minimal dissolving of salts.
- Snow melt and road salt materials will be loaded into spreading devices as needed and as can be consumed. Materials will not remain in spreading devices if unused. Unused road salts will be returned to stockpile.
- Snow melt and road salts will be applied to parking lots and walkways as needed using minimal necessary materials. Materials may be reapplied only as needed for public safety.
- Any spillage of snow melt material or road salts will be returned to the spreading device and applied to appropriate areas. Spilled materials may also be swept and deposited in appropriate waste container.
- Snow melt or road salts that are not dissolved will be blown or swept of parking lots or walkways as needed. Removed materials will either be blown to landscaped areas or collected and deposited in an appropriate waste container.



## Standard Operating Procedures

### Snow and Ice Removal

- Snow and ice will be removed as necessary
- Snow and ice will be removed from parking lots, walkways, and trails with necessary trucks, small equipment, snow blowers, shovels, or other necessary devices.
- Snow will be piled at the edges of parking lots, roads, walkways, or other areas as room allows.
- When possible, snow can be piled onto grass or other planted areas.
- Road salt and/or ice melting materials will be used moderately as necessary.
- Road salt and/or ice melting materials that are not consumed or dissolved within a reasonable amount of time will be swept or blown onto grass or other planted area.

**Appendix C**  
**Training Log**



**Appendix D**  
**Spill Reports**

### NON-STORM WATER DISCHARGE INSPECTION REPORT

Date of Spill: \_\_\_\_\_ Time: \_\_\_\_\_

Location: \_\_\_\_\_

Date of Investigation: \_\_\_\_\_ Time: \_\_\_\_\_

Method of Discovery: \_\_\_\_\_

**REGUALTORY AGENCIES NOTIFICATION (document: date, time, person, agency)**

Carterville City: \_\_\_\_\_

Missouri County Health Department: \_\_\_\_\_

State Environmental services: \_\_\_\_\_

Other: \_\_\_\_\_

**Description and Quantity of Material Spilled:**

- Gasoline     Diesel     Oil     Antifreeze     Other: \_\_\_\_\_
- 1 to 5 Gallons     5 to 10 Gallons     10 to 25 Gallons     More than 25 Gallons

Source: \_\_\_\_\_

Cause: \_\_\_\_\_

**Adverse environmental impact (if any):**

Any Discharge to Storm Drain and or waters of the U.S.?     Yes     No     Do not know

**Immediate remedial actions taken at time of spill:**

- Spill Containment     Sweeping     Absorbent Material     Removal from site
- Other: \_\_\_\_\_

Method of removal and verification: \_\_\_\_\_

Additional comments: \_\_\_\_\_

Analytical Monitoring: \_\_\_\_\_

Enforcement Action: \_\_\_\_\_

Report prepared by: \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_



**Appendix E**  
**Corrective Action Log**



**Appendix F**  
**Comprehensive Inspections**

## Stormwater Runoff Control Inspection Checklist

Instructions: Conduct an inspection of applicable municipal facilities (vehicle maintenance, outdoor storage yards, asphalt and concrete storage, and solid waste collections **annually and save the inspection record**. The "comments" column should either provide the action needed to be taken, or an explanation of why the answer is no.

Facility: \_\_\_\_\_

Conducted By: \_\_\_\_\_

Address: \_\_\_\_\_

Date: \_\_\_/\_\_\_/\_\_\_

City: \_\_\_\_\_

Phone: (\_\_\_\_) \_\_\_\_\_

Municipal Yard	Yes	No	Comments
<b>1. Outdoor Storage:</b> <ul style="list-style-type: none"> <li>• Do &gt;55-gallon drums, bulk storage tanks (i.e. gas/diesel), or other containers that are stored outside have adequate secondary containment and cover?</li> <li>• Are outside storage areas controlled, covered, and contained? (i.e. batteries, chemicals, stockpiles)</li> <li>• If there water or liquid in the secondary containment structures, is it being managed appropriately?</li> </ul>	<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	<i>Any bulk liquid storage &gt; 55 gallons must have secondary containment or equivalent. Batteries should be stored inside or under cover. Stockpiles should be contained in barriers and/or covered. Sweeper/Vac truck waste should be stored so it does not runoff; either in a contained/bermed area that drains to sanitary sewer and/or in a dumpster for transport and disposal.</i>
<b>2. Shop:</b> <ul style="list-style-type: none"> <li>• Is vehicle/equipment maintenance or repair work performed inside?</li> <li>• Are there spill kits located in the shop?</li> </ul>	<input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>	<i>No maintenance or repair work should be performed outside (fleets may perform outside emergency repairs and maintenance activities that do not involve fluids).</i>
<b>3. Wash Area:</b> <ul style="list-style-type: none"> <li>• Are vehicles are washed in a designated washing area that is plumbed to sanitary sewer?</li> <li>• Are mowers/tractors washed in a designated washing area?</li> </ul>	<input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>	<i>Mowers and tractors (only) can be washed over a grassy area if only water is used (no soap). Where are they washed? _____</i>
<b>4. Fueling Island:</b> <ul style="list-style-type: none"> <li>• Is there a spill kit with absorbents available?</li> <li>• Is the area free of spills?</li> </ul>	<input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>	<i>All dirty absorbent should be swept up daily.</i>
<b>5. Salt &amp; Sand:</b> <ul style="list-style-type: none"> <li>• Is the sand/salt mix covered and contained?</li> <li>• Is the surrounding area free of excess material and stains?</li> </ul>	<input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>	<i>Any bulk liquid storage must have secondary containment or equivalent.</i>
<b>6. Wastewater Management:</b> <ul style="list-style-type: none"> <li>• Is the rinse water from pesticide sprayers being disposed of appropriately?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	

<b>Stormwater BMPs/Good Housekeeping</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
1. Are surfaces (parking lots, fueling area) free of spills, debris and trash?	<input type="checkbox"/>	<input type="checkbox"/>	
2. If pressure washing takes place is the water being diverted to landscaping or if soaps are used being used, is the wastewater being collected and sent to sanitary?	<input type="checkbox"/>	<input type="checkbox"/>	<i>No wastewater may reach storm drains.</i>
3. Are stormwater BMPs (inlets, catch basins, culverts, and detention basins) free of debris and cleaned regularly?	<input type="checkbox"/>	<input type="checkbox"/>	
4. Where is stormwater discharged off-site? Are these areas free from obvious pollutants and trash?	<input type="checkbox"/>	<input type="checkbox"/>	<i>Note these areas on the facility map as well as direction of flow.</i>
5. Are fertilizers being used and, if so, are they managed to limit exposure to stormwater?	<input type="checkbox"/>	<input type="checkbox"/>	
6. Is the dumpster area free from leaks and stains?	<input type="checkbox"/>	<input type="checkbox"/>	
7. Are dumpsters covered?	<input type="checkbox"/>	<input type="checkbox"/>	

<b>Training/Reporting</b>		
1. Has applicable staff been trained in stormwater pollution detection and prevention?	<input type="checkbox"/>	<input type="checkbox"/>
2. Have you been trained to perform annual inspections?	<input type="checkbox"/>	<input type="checkbox"/>
3. Are stormwater discharges reported to your municipality's Stormwater Coordinator? What is their name/phone number? _____	<input type="checkbox"/>	<input type="checkbox"/>
4. All stormwater, non-stormwater, and water quality concerns have been either noted or addressed?	<input type="checkbox"/>	<input type="checkbox"/>
<b>Paperwork/Site Plan Map</b>		
1. The facility site map is up-to-date with current pollutant sources and controls noted on the map?	<input type="checkbox"/>	<input type="checkbox"/>
2. This inspection report has been filed to meet the recordkeeping requirement of the MS4 permit?	<input type="checkbox"/>	<input type="checkbox"/>
3. Are SOPs reviewed and are they still accurate for current operations? Where are they stored?	<input type="checkbox"/>	<input type="checkbox"/>

*I certify that the above information is accurate and reflects current conditions.*

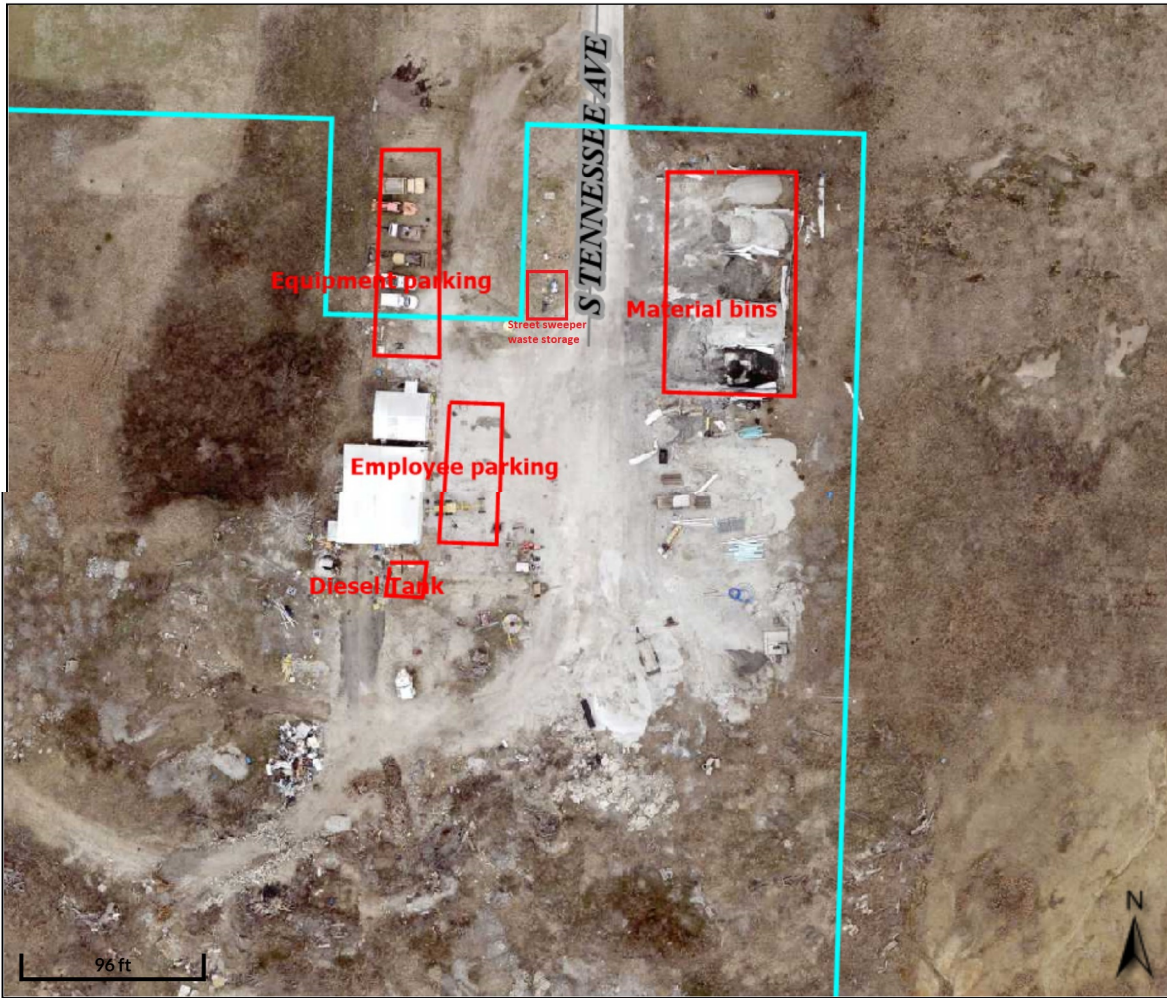
Signature: \_\_\_\_\_

Date: \_\_\_\_\_

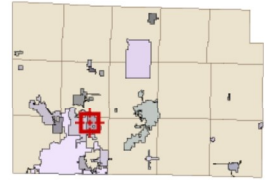
Printed Name: \_\_\_\_\_

Supervisor's Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_



**Overview**



**Legend**

- County Boundary
- Local Roads

<b>Parcel ID</b>	15401740009011001	<b>Alternate ID</b>	14-961059-0000	<b>Owner Address</b>	CARTERVILLE CITY
<b>Sec/Twp/Rng</b>	17-28-32	<b>Class</b>	E		1200 E FIRST
<b>Property Address</b>	TENNESSEE	<b>Acreage</b>	26.49		CARTERVILLE, MO 64835
<b>District</b>	86				
<b>Brief Tax Description</b>	CTV MISC NW SE EX N 12A & EX BEG SE COR LOT 103 S C M & S CO'S 5TH S 100' W 100' N 100' E TO POB				
	(Note: Not to be used on legal documents)				

Date created: 11/6/2023  
 Last Data Uploaded: 11/6/2023 1:39:26 AM







# Staff Training Resources

Training Category  
(from SW Program Training Schedule p 4.6.7 of SWMP)

Specific In-Depth Topics  
(from Table 4.6.B)

Subject	Type	Source	Resource Title	Link	Time	Training Category					Specific In-Depth Topics										
						In-Depth PPGH Training	General PPGH Training	IDDE Inspector Training	Constr. Site SW Inspector Training	Post-Const. SW Mgmt	1	2	3	4	5	6	7	8	9	10	11
Extra Resources - Use as needed, in addition to In-Depth PPGH videos above.																					
General IDDE	Youtube Video	Washington Conservation District	Illicit Discharge Detection and Elimination (IDDE) - For General Staff Education	<a href="https://www.youtube.com/watch?v=5bUJeWbL1XI">https://www.youtube.com/watch?v=5bUJeWbL1XI</a>	3.5 min	x		x									x				
Salt & De-icing Operations	Youtube Video	IowaDOT	Anti-Icing and Deicing - Winter Operations Training Series 12 of 15	<a href="https://www.youtube.com/watch?v=HZIZbWybiU">https://www.youtube.com/watch?v=HZIZbWybiU</a>	7.5 min	x											x				
Salt & De-icing Operations	Document	APWA	Brine Fact Sheet	<a href="https://sicop.transportation.org/wp-content/uploads/sites/36/2017/07/5.6-APWA-03-Salt-Brine-Fact-Sheet.pdf#:~:text=BRINE%20APWA%20Winter%20Maintenance%20Sub-Committee%20FACT%20SHEET%20Anti-icing,bond%20after%20snow%20has%20frozen%20to%20the%20road.">https://sicop.transportation.org/wp-content/uploads/sites/36/2017/07/5.6-APWA-03-Salt-Brine-Fact-Sheet.pdf#:~:text=BRINE%20APWA%20Winter%20Maintenance%20Sub-Committee%20FACT%20SHEET%20Anti-icing,bond%20after%20snow%20has%20frozen%20to%20the%20road.</a>	10 min	x											x				
Salt & De-icing Operations	Various	Minnesota	Smart Salt Training	<a href="https://www.pca.state.mn.us/business-with-us/smart-salting-training">https://www.pca.state.mn.us/business-with-us/smart-salting-training</a>	n/a	x											x				

Additional Resources - Add as needed																	

PPGH = Pollution Prevention/Good Housekeeping for municipal operations  
 IDDE = Illicit Discharge Detection and Elimination  
 SW = Stormwater  
 Const. = Construction

In-Depth Topics from SWMP Table 4.6.B  
 1 = Vehicle and equipment washing  
 2 = Fluid disposal and spills  
 3 = Fleet, equipment, and building maintenance  
 4 = Park and open space maintenance procedures  
 (including fertilizer, herbicide, pesticide application)  
 5 = New construction, road maintenance, and land disturbances

6 = Stormwater system maintenance  
 7 = MS4 operated salt and de-icing operations  
 8 = Fueling  
 9 = Solid waste disposal  
 10 = Street sweeper operations  
 11 = Illicit Discharges

## **Stormwater Program Training Schedule**

1. In-Depth Training for Pollution Prevention/Good Housekeeping (PPGH) – MCM6
  - a. Frequency: ANNUAL
  - b. Topics: See table in section 4.6.B.
  - c. Applicable Staff :
    - i. Building maintenance/custodial staff
    - ii. Fleet maintenance staff;
    - iii. Staff at facilities with fuel, chemicals, washing of vehicles or equipment;
    - iv. Road maintenance staff;
    - v. Road salt/de-icing staff; and
    - vi. Parks, swimming pool, or golf course staff who encounter spills, equipment or vehicle washing, fueling, chemicals, etc.
  
2. General Training for Pollution Prevention/Good Housekeeping – MCM6
  - a. Frequency:
    - i. Existing Employees: Initial training
    - ii. New Employees: Within one year of being hired
    - iii. Additional training as needed.
  - b. Applicable Staff: All employees not listed in number 1 above.
  
3. Illicit Discharge Detention and Elimination (IDDE) Training – MCM3
  - a. Frequency:
    - i. Existing Employees: Initial training
    - ii. New Employees: Within one year of being hired
  - b. Applicable staff include:
    - i. IDDE inspection staff;
    - ii. Building inspection staff;
    - iii. Construction inspection staff;
    - iv. Fleet maintenance staff;
    - v. Staff at facilities with fuel, chemicals, washing of vehicles or equipment;
    - vi. Road maintenance staff;
    - vii. Road salt/de-icing staff; and
    - viii. Parks, swimming pool, or golf course staff who encounter spills, equipment or vehicle washing, fueling, chemicals, etc.
    - ix. Police
  
4. Training for Construction Site Runoff Control & Post-Construction Stormwater Management – MCM4 & MCM5
  - a. Frequency: Once per permit cycle (Sept 2021-August 2026)
  - b. Applicable staff include:
    - i. Construction Inspection staff;
    - ii. Inspection staff for Long-Term BMP inspections