

# City of Bloomfield Hills

## National Pollutant Discharge Elimination System

### Permit Application for Discharge of Storm Water to Surface Waters of the State from a Municipal Separate Storm Sewer System

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# City of Bloomfield Hills

## Section 1: Applicant Information

City of Bloomfield Hills

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Title City Manager Company Name City of Bloomfield Hills  
Phone 248-644-1520 Ext Fax 248-644-4813  
Email Jcravens@bloomfieldhillsmi.net  
Address Line 1 or Location 45 E. Long Lake Road  
Address Line 2  
City Bloomfield Hills Postal Code 48304  
State Michigan Country United States of America

## Section 3: MS4 Contacts

Storm Water Billing Contact  
Storm Water Program Manager  
Application Contact

Prefix: Mr. First Name Jay Last Name Cravens  
Title City Manager Company Name City of Bloomfield Hills  
Phone 248-644-1520 Ext Fax 248-644-4813  
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Address Line 1 or Location 45 E. Long Lake Road  
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State Michigan Country United States of America

## **Section 4: Regulated Area, Outfalls/Points of Discharge, and Nested Jurisdictions**

### **Outfall and Point of Discharge Information**

Provide the following information for each of the applicant's MS4 outfalls and points of discharge within the regulated area: identification number, description of whether the discharge is from an outfall or point of discharge, and the surface water of the state that receives the discharge. An outfall means a discharge point from an MS4 directly to surface waters of the state. A point of discharge means a discharge from an MS4 to an MS4 owned or operated by another public body. In the case of a point of discharge, the surface water of the state is the ultimate receiving water from the final outfall. Please note that an MS4 is not a surface water of the state. For example, an open county drain that is a surface water of the state is not an MS4. An example table is available at the link below.

Attachment: [Appendix A - City Outfall Spreadsheet](#)

Comment:

### **Nested Jurisdictions**

Submit the name and general description of each nested MS4 for which a cooperative agreement has been reached to carry out the terms and conditions of the permit for the nested jurisdiction. The applicant shall be responsible for assuring compliance with the permit for those nested jurisdictions with which they have entered into an agreement and listed as part of the Application. If the primary jurisdiction and the nested jurisdiction agree to cooperate so that the terms and conditions of the permit are met for the nested MS4, the nested jurisdiction does not need to apply for a separate permit. A city, village, or township shall not be a nested jurisdiction.

[None](#)

## **Section 5: General SWMP, Enforcement Response Procedure, and Public Participation/Involvement Program**

### **STORM WATER MANAGEMENT PROGRAM (SWMP)**

This Application requires a description of the Best Management Practices (BMPs) the applicant will implement for each minimum control measure and the applicable water quality requirements during this permit cycle. The applicant shall incorporate the BMPs to develop a SWMP as part of the Application. The SWMP shall be developed, implemented, and enforced to reduce the discharge of pollutants from the MS4 to the Maximum Extent Practicable and protect water quality in accordance with the appropriate water quality requirements of the NREPA 451, Public Acts of 1994, Part 31, and the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq.). The Maximum Extent Practicable may be met by implementing the BMPs identified in the SWMP and demonstrating the effectiveness of the BMPs. The applicant shall attach any appropriate and necessary documentation to demonstrate compliance with the six minimum control measures and applicable water quality requirements as part of the Application. The applicant shall complete this Application to the best of its knowledge and ensure that it is true, accurate, and meets the minimum requirements for a SWMP to the Maximum Extent Practicable. Several minimum control measures include a statement requesting the applicant to indicate in the response if you are, or will be, working collaboratively with watershed or regional partners on any or all activities to meet the minimum control measure requirements. If the applicant chooses to work collaboratively with watershed or regional partners to implement parts of the SWMP, each applicant will be responsible for complying with the minimum permit requirements. For purposes of this Application, a procedure means a written process, policy or other mechanism describing how the applicant will implement minimum requirements. When answering the questions in this section of the Application, the applicant's MS4 encompasses what the applicant identified in Sections 4. The applicant shall include a measurable goal for each BMP. Each measurable goal shall include, as appropriate, a schedule for BMP implementation (months and years), including interim milestones and the frequency of the action. Each measurable goal shall have a measure of assessment to measure progress towards achieving the measurable goal. A United States Environmental Protection Agency (USEPA) guidance document on measurable goals is available at the link below.

### **Enforcement Response Procedure (ERP)**

The applicant shall describe the current and proposed enforcement responses to address violations of the

applicant's ordinances and regulatory mechanisms identified in the SWMP. The following question represents the minimum requirement for the ERP. Please complete the question below.

1. Provide the ERP. The ERP shall include the applicant's expected response to violations to compel compliance with an ordinance or regulatory mechanism implemented by the applicant in the SWMP (e.g., written notices, citations, and fines). The ERP shall contain a method for tracking instances of non-compliance, including, as appropriate, the entity responsible for violating the applicant's ordinance or regulatory mechanism, the date and location of the violation, a description of the violation, a description of the enforcement response used, a schedule for returning to compliance, and the date the violation was resolved. The applicant may keep an electronic file or hard copy file of the enforcement tracking. For best results please upload one document at a time.

Attachment: [Appendix B – Enforcement Response Procedure](#)

Comment: [The City provides information on how to report a complaint/concern under the Environment area on the "Community" tab on the City website.](#)

### **Public Participation/Involvement Program (PPP)**

The applicant shall describe the current and proposed BMPs to meet the minimum control measure requirements for the PPP to the maximum extent practicable, which shall be incorporated into the SWMP. Please indicate in your response if you are, or will be, working collaboratively with watershed or regional partners on any or all activities in the PPP during the permit cycle (i.e., identify collaborative efforts in the procedures). The following questions represent the minimum control measure requirements for the PPP. Please complete all the questions below. A measurable goal with a measure of assessment shall be included for each BMP, and, as appropriate, a schedule for implementation (months and years), including interim milestones and the frequency of the BMP. The responses shall reflect the nested MS4s identified in Section 4.

Proposing to work collaboratively on any or all activities in the PPP during the permit cycle? [Yes](#)

### **PPP Procedures**

Provide the procedures that describe the current and proposed BMPs to meet the minimum control measure requirements for the PPP to the maximum extent practicable as required below. It is recommended that files be separated and then converted to a PDF format before being attached below to meet the file size limit. For best results please upload one document at a time.

Attachment: [Appendix C - Collaborative Public Participation/Involvement Program](#)

Comment:

2. Provide the reference to the procedure submitted above for making the SWMP available for public inspection and comment. The procedure shall include a process for notifying the public when and where the SWMP is available and of opportunities to provide comment. The procedure shall also include a process for complying with local public notice requirements, as appropriate. (page and paragraph of attachments): e.g., Attachment A, Page 3, Section b.

[Appendix C - Collaborative Public Participation/Involvement Program, Section B](#)

3. Provide the reference to the procedure submitted above for inviting public involvement and participation in the implementation and periodic review of the SWMP. (page and paragraph of attachments):

[Appendix C - Collaborative Public Participation/Involvement Program, Section D](#)

### **Section 6: Public Education Program**

The applicant shall describe the current and proposed BMPs to meet the minimum control measure requirements for the Public Education Program (PEP) to the maximum extent practicable, which shall be incorporated into the SWMP. Please indicate in your response if you are, or will be, working collaboratively with watershed or regional partners on any or all activities in the PEP during the permit cycle. The following questions represent the minimum requirements for the PEP. Please complete all the questions below. A measurable goal with a measure of assessment shall be included for each BMP, and, as appropriate, a schedule for implementation (months and years), including interim milestones and the frequency of the BMP.

The responses shall reflect the nested MS4s identified in Section 4.

### **PEP Procedures**

Provide the procedures that describe the current and proposed BMPs to meet the minimum control measure requirements for the PEP to the maximum extent practicable as required below. For best results please upload one document at a time.

Attachment: [Appendix D - Collaborative Public Education Program](#)

Comment:

4. PEP activities may be prioritized based on the assessment of high priority, community-wide issues and targeted issues to reduce pollutants in storm water runoff. If prioritizing PEP activities, provide the reference to the procedure submitted above with the assessment and list of the priority issues (e.g., Attachment A, Section 1).

[Appendix D – Collaborative Public Education Program, Section A](#)

5. Provide the reference to the procedure submitted above identifying applicable PEP topics and the activities to be implemented during the permit cycle. If prioritizing, prioritize each applicable PEP topics as high, medium, or low based on the assessment in Question 4. For each applicable PEP topic below, identify in the procedure the target audience; key message; delivery mechanism; year and frequency the BMP will be implemented; and the responsible party. If a PEP topic is determined to be not applicable or a priority issue, provide an explanation. An example PEP table is available at the link below.

- A. Promote public responsibility and stewardship in the applicant's watershed(s). Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.  
[High. See Table 2. Appendix D - Collaborative Public Education Program, Section C](#)
- B. Inform and educate the public about the connection of the MS4 to area waterbodies and the potential impacts discharges could have on surface waters of the state. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.  
[High. See Table 2. Appendix D - Collaborative Public Education Program, Section C](#)
- C. Educate the public on illicit discharges and promote public reporting of illicit discharges and improper disposal of materials into the MS4. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.  
[High. See Table 2. Appendix D - Collaborative Public Education Program, Section C](#)
- D. Promote preferred cleaning materials and procedures for car, pavement, and power washing. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.  
[Medium. See Table 2. Appendix D - Collaborative Public Education Program, Section C](#)
- E. Inform and educate the public on proper application and disposal of pesticides, herbicides, and fertilizers. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.  
[High. See Table 2. Appendix D - Collaborative Public Education Program, Section C](#)
- F. Promote proper disposal practices for grass clippings, leaf litter, and animal wastes that may enter into the MS4. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.  
[High. See Table 2. Appendix D - Collaborative Public Education Program, Section C](#)
- G. Identify and promote the availability, location, and requirement of facilities for collection or disposal of household hazardous wastes, travel trailer sanitary wastes, chemicals, and motor vehicle fluids. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.  
[High. See Table 2. Appendix D - Collaborative Public Education Program, Section C](#)
- H. Inform and educate the public on proper septic system care and maintenance, and how to recognize system failure. Provide the reference to the procedure submitted above or explanation as to why the topic

is not applicable.

High. See Table 2. Appendix D - Collaborative Public Education Program, Section C

- I. Educate the public on, and promote the benefits of, green infrastructure and low impact development. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.

High. See Table 2. Appendix D - Collaborative Public Education Program, Section C

- J. Identify and educate commercial, industrial, and institutional entities likely to contribute pollutants to storm water runoff. Provide the reference to the procedure submitted above or explanation as to why the topic is not applicable.

Low. See Table 2. Appendix D - Collaborative Public Education Program, Section C

6. Provide the reference to the procedure submitted above for evaluating and determining the effectiveness of the overall PEP. The procedure shall include a method for assessing changes in public awareness and behavior resulting from the implementation of the PEP and the process for modifying the PEP to address ineffective implementation. e.g., Attachment A, Page 3, Section b.

Appendix D - Collaborative Public Education Program, Section D

### **Section 7: Illicit Discharge Elimination Program**

The applicant shall describe the current and proposed BMPs to meet the minimum control measure requirements for the Illicit Discharge Elimination Program (IDEP) to the Maximum Extent Practicable, which shall be incorporated into the SWMP. The following questions represent the minimum control measure requirements for the IDEP. Please complete all the questions below. A measurable goal with a measure of assessment shall be included for each BMP, and, as appropriate, a schedule for implementation (months and years), including interim milestones and the frequency of the BMP. The responses shall reflect the nested MS4s identified in Section 4. Please indicate in your response if you are or will be working collaboratively with watershed or regional partners on any or all BMPs in the IDEP during the permit cycle (e.g., identify collaborative efforts in the procedures). The following definitions apply to the terms used below: • Illicit Discharge: Any discharge to, or seepage into, an MS4 that is not composed entirely of storm water or uncontaminated groundwater except discharges pursuant to an NPDES permit. A discharge that originates from the applicant's property and meets the illicit discharge definition is considered an illicit discharge. • Illicit Connection: A physical connection to an MS4 that primarily conveys non-storm water discharges other than uncontaminated groundwater into the MS4; or a physical connection not authorized or permitted by the local authority, where a local authority requires authorization or a permit for physical connections.

Proposing to work collaboratively on any or all BMPs in the IDEP during the permit cycle? Yes

#### **Illicit Discharge Elimination Program Procedures**

Provide the procedure that describes the current and proposed BMPs to meet the minimum control measure requirements for the IDEP to the maximum extent practicable as required below.

Attachments: [Appendix E - Collaborative Illicit Discharge Elimination Program](#), [Appendix J – Municipal Separate Storm Sewer System Ordinance](#)

Comment:

#### **Storm Sewer System Map**

7. Provide the location where an up-to-date storm sewer system map(s) is available. The map(s) shall identify the following: the storm sewer system, the location of all outfalls and points of discharge, and the names and location of the surface waters of the state that receive discharges from the permittee's MS4 (for both outfalls and points of discharge). A separate storm sewer system includes: roads, catch basins, curbs, gutters, parking lots, ditches, conduits, pumping devices, and man-made channels. A storm sewer system map(s) may include available diagrams, such as certification maps, road maps showing rights-of-way, as-built drawings, or other hard copy or digital representation of the storm sewer system. (e.g., The Department of Public Works office)

Comment: [The Master Storm Sewer Map is updated regularly by the Engineering Consultant and current maps are available at City Hall and the Department of Public Works. As-built plans for utilities and developments are also maintained by the City.](#)

### **Illicit Discharge Identification and Investigation**

8. The MS4 may be prioritized for detecting non-storm water discharges during the permit cycle. The goal of the prioritization process is to target areas with high illicit discharge potential. If prioritizing, provide the reference to the procedure submitted above with the process for selecting each priority area using the list below. (e.g., Attachment A, page 3, Section b.)

- Areas with older infrastructure
- Industrial, commercial, or mixed use areas
- Areas with a history of past illicit discharges
- Areas with a history of illegal dumping
- Areas with septic systems
- Areas with older sewer lines or with a history of sewer overflows or cross-connections
- Areas with sewer conversions or historic combined sewer systems
- Areas with poor dry-weather water quality
- Areas with water quality impacts, including waterbodies identified in a Total Maximum Daily Load
- Priority areas applicable to the applicant not identified above

Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b

[Appendix E - Rouge River Collaborative IDEP, Section C](#)

9. If prioritizing dry-weather screening, provide the reference to the document submitted above with the geographical location of each prioritized area using either a narrative description or map and identify the prioritized areas that will be targeted during the permit cycle.

[Appendix E - Rouge River Collaborative IDEP, Section C](#)

10. Provide the procedure for performing field observations at all outfalls and points of discharge in the priority areas as identified in the procedure above or for the entire MS4 during dry-weather at least once during the permit cycle. The procedure shall include a schedule for completing the field observations during the permit cycle or more expeditiously if the applicant becomes aware of a non-storm water discharge. As part of the procedure, the applicant may submit an interagency agreement with the owner or operator of the downstream MS4 identifying responsibilities for ensuring an illicit discharge is eliminated if originating from the applicant's point(s) of discharge. The interagency agreement would eliminate the requirement for performing a field observation at that point(s) of discharge. Areas not covered by the interagency agreement shall be identified with a schedule for performing field observations included in the procedure. The focus of the field observation shall be to observe the following:

- Presence/absence of flow
- Water clarity
- Deposits/stains on the discharge structure or bank
- Color
- Vegetation condition
- Odor
- Structural condition
- Floatable materials
- Biology, such as bacterial sheens, algae, and slimes

Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #2](#)

11. Provide the reference to the procedure submitted above for performing field screening if flow is observed at an outfall or point of discharge and the source of an illicit discharge is not identified during the field observation. Field screening shall include analyzing the discharge for indicator parameters (e.g., ammonia, fluoride, detergents, and pH). The procedure shall include a schedule for performing field screening.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #3](#)

12. Provide the reference to the procedure submitted above for performing a source investigation if the source of an illicit discharge is not identified by field screening. The procedure shall include a schedule for performing a source investigation.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #3](#)

13. Provide the reference to the procedure submitted above for responding to illegal dumping/spills. The procedure shall include a schedule for responding to complaints, performing field observations, and follow-up field screening and source investigations as appropriate.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #5](#)

14. If prioritizing, provide the reference to the procedure submitted above for responding to illicit discharges upon becoming aware of such a discharge outside of the priority areas. The procedure shall include a schedule for performing field observations, and follow-up field screening and source investigation as appropriate. If not prioritizing, enter "Not Applicable."

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #5](#)

15. Provide the reference to the procedure submitted above which includes a requirement to immediately report any release of any polluting materials from the MS4 to the surface waters or groundwaters of the state, unless a determination is made that the release is not in excess of the threshold reporting quantities in the Part 5 Rules, by calling the appropriate MDEQ District Office, or if the notice is provided after regular working hours call the MDEQ's 24-Hour Pollution Emergency Alerting System telephone number: 800-292-4706. (Example threshold reporting quantities: a release of 50 pounds of salt in solid form or 50 gallons in liquid form to waters of the state unless authorized by the MDEQ for deicing or dust suppressant.)

[Appendix H - P2GH Spill Response SOP, Section C](#)

16. If the procedures requested in Questions 8 through 14 do not accurately reflect the applicant's procedure(s), provide the reference to the procedure(s) submitted above describing the alternative approach to meet the minimum requirements.

17. Provide the reference to the procedure submitted above for responding to illicit discharges once the source is identified. The procedure shall include a schedule to eliminate the illicit discharge and pursue enforcement actions. The procedure shall also address illegal spills/dumping.

[Appendix E - Rouge River Collaborative IDEP, Section E](#)

### **IDEP Training and Evaluation**

18. Provide the reference to the program submitted above to train staff employed by the applicant, who, as part of their normal job responsibilities, may come into contact with or otherwise observe an illicit discharge to the regulated MS4, on the following topics. The program shall include a training schedule for this permit cycle. It is recommended that staff be trained more than once per permit cycle.

- Techniques for identifying an illicit discharge or connection, including field observation, field screening, and source investigation.
- Procedures for reporting, responding to, and eliminating an illicit discharge or connection and the proper enforcement response.
- The schedule and requirement for training at least once during the term of this permit cycle for existing staff and within the first year of hire for new staff.

Provide the reference to the program submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #4](#)

19. Provide the reference to the procedure submitted above for evaluating and determining the overall effectiveness of the IDEP. The procedure shall include a schedule for implementation. Examples of evaluating overall effectiveness include, but are not limited to, the following: evaluate the prioritization process to determine if efforts are being maximized in areas with high illicit discharge potential; evaluate the effectiveness of using different detection methods; evaluate the number of discharges and/or quantity of discharges eliminated using different enforcement methods; and evaluate program efficiency and staff training frequency.

[Appendix E - Rouge River Collaborative IDEP, Section F](#)

### **Illicit Discharge Ordinance or Other Regulatory Mechanism**

20. Provide the reference to the in effect ordinance or regulatory mechanism submitted above that prohibits non-storm water discharges into the applicant's MS4 (except the non-storm water discharges addressed in Questions 21 and 22).

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #7 and Attachment E.](#)

[Appendix J - Municipal Separate Storm Sewer System Ordinance.](#)

21. Provide the reference to the ordinance or other regulatory mechanism submitted above that excludes prohibiting the discharges or flows from firefighting activities to the applicant's MS4 and requires that these discharges or flows only be addressed if they are identified as significant sources of pollutants to waters of the State. The ordinance shall not authorize illicit discharges; however, the applicant may choose to exclude prohibiting the discharges and flows from firefighting activities if they are identified as not being significant sources of pollutants to waters of the state.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #7 and Attachment E.](#)

[Appendix J - Municipal Separate Storm Sewer System Ordinance, Section 21-323.](#)

22. Provide the reference to the ordinance or other regulatory mechanism submitted above that excludes prohibiting the following categories of non-storm water discharges or flows if identified as significant contributors to violations of Water Quality Standards. The ordinance shall not authorize illicit discharges; however, the applicant may choose to exclude prohibiting the following discharges or flows if they are identified as not being a significant contributor to violations of Water Quality Standards.

- a. Water line flushing and discharges from potable water sources
- b. Landscape irrigation runoff, lawn watering runoff, and irrigation waters
- c. Diverted stream flows and flows from riparian habitats and wetlands
- d. Rising groundwaters and springs
- e. Uncontaminated groundwater infiltration and seepage
- f. Uncontaminated pumped groundwater, except for groundwater cleanups specifically authorized by NPDES permits
- g. Foundation drains, water from crawl space pumps, footing drains, and basement sump pumps
- h. Air conditioning condensation
- i. Waters from noncommercial car washing
- j. Street wash water
- k. Dechlorinated swimming pool water from single, two, or three family residences. (A swimming pool operated by the permittee shall not be discharged to a separate storm sewer or to surface waters of the state without NPDES permit authorization from the MDEQ.)

Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #7 and Attachment E.](#)

[Appendix J - Municipal Separate Storm Sewer System Ordinance, Section 21-323.](#)

23. Provide the reference to the ordinance or regulatory mechanism submitted above that regulates the contribution of pollutants to the applicant's MS4 in the attachment above.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #7 and Attachment E.](#)

[Appendix J - Municipal Separate Storm Sewer System Ordinance, Division 3.](#)

24. Provide the reference to the ordinance or regulatory mechanism submitted above that prohibits illicit discharges, including illicit connections and the direct dumping or disposal of materials into the applicant's MS4 in the attachment above.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #7 and Attachment E.](#)

[Appendix J - Municipal Separate Storm Sewer System Ordinance, Division 3.](#)

25. Provide the reference to the ordinance or regulatory mechanism submitted above with the authority established to inspect, investigate, and monitor suspected illicit discharges into the applicant's MS4 in the attachment above.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #7 and Attachment E.](#)

[Appendix J - Municipal Separate Storm Sewer System Ordinance, Section 21-327.](#)

26. Provide the reference to the ordinance or regulatory mechanism submitted above that requires and enforces elimination of illicit discharges into the applicant's MS4, including providing the applicant the authority to eliminate the illicit discharge in the attachment above.

[Appendix E - Rouge River Collaborative IDEP, Section D, IDEP #7 and Attachment E.](#)

[Appendix J - Municipal Separate Storm Sewer System Ordinance, Division 4.](#)

## **Section 8. Construction Storm Water Runoff Control Program**

The applicant shall describe the current and proposed BMPs to meet the minimum control measure requirements for the construction storm water runoff control program to the maximum extent practicable, which shall be incorporated into the SWMP. Please indicate in your response if you are or will be working collaboratively with watershed or regional partners on any or all requirements of this program during the permit cycle (e.g., identify collaborative efforts in the procedures). The following questions represent the minimum control measure requirements for the construction storm water runoff control program. Please complete all the questions below. A measurable goal with a measure of assessment shall be included for each BMP, and, as appropriate, a schedule for implementation (months and years), including interim milestones and the frequency of the BMP. The responses shall reflect the nested MS4s identified in Section 4.

Proposing to work collaboratively on any or all requirements of the Construction Storm Water Runoff Control Program during the permit cycle? [No](#)

### **Qualifying Local Soil Erosion and Sedimentation Control Programs**

27. Is the applicant a Part 91 Agency? [Yes](#)  
If yes, choose type: [Municipal Enforcement Agency](#)

No the applicant relies on the following Qualifying Local Soil Erosion and Sedimentation Control Program (Part 91 Agency)

### **Construction Storm Water Runoff Control**

Provide the procedures that describe the current and proposed BMPs to meet the minimum control measure requirements for the Construction Storm Water Runoff Control Program to the maximum extent practicable as required below. It is recommended that files be separated and then converted to a PDF format before being attached below to meet the file size limit. For best results please upload one document at a time.

Attachment: [Appendix F - Construction Site Stormwater Runoff Control SOP](#), [Appendix J - Soil Erosion and Sedimentation Control Ordinance](#).

Comment:

28. Provide the reference to the procedure submitted above with the process for notifying the Part 91 Agency or appropriate staff when soil or sediment is discharged to the applicant's MS4 from a construction activity, including the notification timeframe. The procedure shall allow for the receipt and consideration of complaints or other information submitted by the public or identified internally as it relates to construction storm water runoff control. For non-Part 91 agencies, consideration of complaints may include referring the complaint to the qualifying local Soil Erosion and Sedimentation Control Program as appropriate. Construction activity is defined pursuant to Part 21, Wastewater Discharge Permits, Rule 323.2102 (K). The applicant may consider as part of their procedure when and under what circumstances the Part 91 Agency or appropriate staff will be contacted.

[Appendix F - Construction Site Stormwater Runoff Control SOP, Section C.](#)

[Appendix J - Soil Erosion and Sedimentation Control Ordinance.](#)

[When an issue is discovered the City investigates and enforces the SESC Ordinance, Permit, and requires clean up.](#)

29. Provide the reference to the procedure submitted above with the requirement to notify the MDEQ when soil, sediment, or other pollutants are discharged to the applicant's MS4 from a construction activity, including the notification timeframe. Other pollutants include pesticides, petroleum derivatives, construction chemicals, and solid wastes that may become mobilized when land surfaces are disturbed. The applicant may consider as part of their procedure when and under what circumstances the MDEQ will be contacted.

[Appendix F - Construction Site Stormwater Runoff Control SOP, Section E.](#)

[If pollutants like pesticides, petroleum, or construction chemicals are discharged, the MDEQ PEAS Hotline is contacted.](#)

30. Provide the reference to the procedure submitted above for ensuring that construction activity one acre or greater in total earth disturbance with the potential to discharge to the applicant's MS4 obtains a Part 91 permit, or is conducted by an approved Authorized Public Agency as appropriate. Note: For applicants that conduct site

plan review, the procedure must be triggered at the site plan review stage.

[Appendix F - Construction Site Stormwater Runoff Control SOP, Section B.](#)

[Appendix J - Soil Erosion and Sedimentation Control Ordinance, Section 17-32.](#)

The City's Building Permit Application indicates that the SESC permit must be obtained prior to issuance of a building permit.

31. Provide the reference to the procedure submitted above to advise the landowner or recorded easement holder of the property where the construction activity will occur of the State of Michigan Permit by Rule (Rule 323.2190).

[Appendix F - Construction Site Stormwater Runoff Control SOP, Section F.](#)

All permits (through Part 91, Permit By Rule) are required prior to the start of construction.

## **Section 9. Post-Construction Storm Water Runoff Program**

### **Post-Construction Storm Water Runoff Program Procedures, Ordinances, and regulatory Mechanisms**

Provide the procedures that describes the current and proposed BMPs to meet the minimum control measure requirements for the Post-Construction Storm Water Runoff Program to the maximum extent practicable as required below. It is recommended that files be separated and then converted to a PDF format before being attached below to meet the file size limit. For best results please upload one document at a time.

Attachment: [Appendix G - OCWRC Standards, Appendix J - Stormwater Management Ordinance](#)

Comment: [Appendix G.](#) The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

### **Ordinance or Other Regulatory Mechanism**

32. Provide the reference to the in-effect ordinance or regulatory mechanism submitted above to address post-construction storm water runoff from new development and redevelopment projects, including preventing or minimizing water quality impacts. The ordinance or other regulatory mechanism shall apply to private, commercial, and public projects, including projects where the applicant is the developer. This requirement may be met using a single ordinance or regulatory mechanism or a combination of ordinances and regulatory mechanisms. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

[Appendix G.](#) The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

33. Provide the reference to the ordinance or other regulatory mechanism submitted above that applies to projects that disturb at least one or more acres, including projects less than an acre that are part of a larger common plan of development or sale and discharge into the applicant's MS4. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

[Appendix G.](#) The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

### **Federal Facilities**

Federal facilities are subject to the Energy Independence and Security Act of 2007. Section 438 of this legislation establishes post-construction storm water runoff requirements for federal development and redevelopment projects.

34. Is the applicant the owner or operator of a federal facility with a storm water discharge.

No

35. Provide the reference to the regulatory mechanism submitted above with the requirement to implement the post-construction storm water runoff control requirements in Section 438 of the Energy Independence and Security Act. If not available at this time, provide the date the regulatory mechanism will be available. Provide the reference to the regulatory mechanism submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

### **Water Quality Treatment Performance Standard**

36. Does the ordinance or other regulatory mechanism include one or more of the following water quality treatment standards?

- Treat the first one inch of runoff from the entire project site. Provide the ordinance or regulatory mechanism reference in the attachment above (page and paragraph of attachments): e.g., Attachment A, Pages 1-15
- Treat the runoff generated from 90 percent of all runoff-producing storms for the project site. Provide the ordinance or regulatory mechanism reference in the attachment above (page and paragraph of attachments): e.g., Attachment A, Pages 1-15

If no, provide the date the ordinance or regulatory mechanism will be submitted.

[Appendix G. The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.](#)

37. If the applicant has chosen the water quality treatment standard of requiring treatment of the runoff generated from 90 percent of all runoff-producing storms, what is the source of the rainfall data?

[Appendix G. The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.](#)

38. Provide the reference to the ordinance or regulatory mechanism submitted above with the requirement that BMPs be designed on a site-specific basis to reduce post-development total suspended solids loadings by 80 percent or achieve a discharge concentration of total suspended solids not to exceed 80 milligrams per liter. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

[Appendix G. The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.](#)

### **Channel Protection Performance Standard**

39. Provide the reference to the ordinance or regulatory mechanism submitted above with the requirement that the post-construction runoff rate and volume of discharges not exceed the pre-development rate and volume for all storms up to the two-year, 24-hour storm at the project site. At a minimum, pre-development is the last land use prior to the planned new development or redevelopment. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

Provide the reference to the ordinance or regulatory mechanism submitted above.

If pursuing an alternative approach, provide the reference to the ordinance or other regulatory mechanism submitted above describing the alternative to meet the minimum requirements, including an explanation as to how the channel protection standard will prevent or minimize water quality impacts.

[Appendix G. The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.](#)

40. The channel protection performance standard is not required for the following waterbodies: the Great Lakes or connecting channels of the Great Lakes; Rouge River downstream of the Turning Basin; Saginaw River; Mona Lake and Muskegon Lake (Muskegon County); and Lake Macatawa and Spring Lake (Ottawa County). If applicable, provide the reference to the ordinance or regulatory mechanism submitted above that excludes any waterbodies from the channel protection performance standard. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

[Not Applicable](#)

### **Site-Specific Requirements**

41. Provide the reference to the procedure submitted above for reviewing the use of infiltration BMPs to meet the water quality treatment and channel protection standards for new development or redevelopment projects in areas of soil or groundwater contamination in a manner that does not exacerbate existing conditions. The procedure shall include the process for coordinating with MDEQ staff as appropriate.

[Appendix G. The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.](#)

42. Provide the reference to the ordinance or regulatory mechanism submitted above that requires BMPs to address the associated pollutants in potential hot spots as part of meeting the water quality treatment and channel protection standards for new development or redevelopment projects. Hot spots include areas with the potential for significant pollutant loading such as gas stations, commercial vehicle maintenance and repair, auto recyclers, recycling centers, and scrap yards. Hot spots also include areas with the potential for contaminating public water supply intakes. If not available at this time, provide the date the ordinance or regulatory mechanism

will be available.

Appendix G. The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

### **Off-Site Mitigation and Payment in Lieu Programs**

43. An applicant may choose to allow for the approval of off-site mitigation for redevelopment projects that cannot meet 100 percent of the performance standards on-site after maximizing storm water retention. Off-site mitigation refers to BMPs implemented at another location within the same jurisdiction and watershed/sewershed as the original project. A watershed is the geographic area included in a 10-digit Hydrologic Unit Code and a sewershed is the area where storm water is conveyed by the applicant's MS4 to a common outfall or point of discharge. If proposing to allow for off-site mitigation, provide the reference to the ordinance or regulatory mechanism submitted above with the off-site mitigation requirements. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

The City of Bloomfield Hills does not currently have an ordinance or regulatory mechanism that meets the optional requirements. The City will not be pursuing this option.

44. An applicant may choose to allow for the approval of payment in lieu for projects that cannot meet 100 percent of the performance standards on-site after maximizing storm water retention. A payment in lieu program refers to a developer paying a fee to the applicant that is applied to a public storm water management project within the same jurisdiction and watershed/sewershed as the original project in lieu of installing the required BMPs onsite. The storm water management project may be either a new BMP or a retrofit to an existing BMP and shall be developed in accordance with the applicant's performance standards. A watershed is the geographic area included in a 10-digit Hydrologic Unit Code and a sewershed is the area where storm water is conveyed by the applicant's MS4 to a common outfall or point of discharge. If proposing to allow for payment in lieu, provide the reference to the ordinance or regulatory mechanism submitted above with the payment in lieu requirements. If not available at this time, provide the date the ordinance or regulatory mechanism will be available. If not pursuing the options available in Questions 43 and 44, skip to Question 52.

The City of Bloomfield Hills does not currently have an ordinance or regulatory mechanism that meets the optional requirements. The City will not be pursuing this option.

45. Provide the reference the ordinance or regulatory mechanism submitted above that establishes criteria for determining the conditions under which off-site mitigation and/or payment in lieu are available and require technical justification as to the infeasibility of on-site management. The determination that performance standards cannot be met on-site shall not be based solely on the difficulty or cost of implementing, but shall be based on multiple criteria related to the physical constraints of the project site, such as: too small of a lot outside of the building footprint to create the necessary infiltrative capacity even with amended soils; soil instability as documented by a thorough geotechnical analysis; a site use that is inconsistent with the capture and reuse of storm water; too much shade or other physical conditions that preclude adequate use of plants. The criteria shall also include consideration of the stream order and location within the watershed/sewershed as it relates to the water quality impacts from the original project site (e.g., the water quality impact from a project site with a discharge to a small-sized stream would be greater than a project site on a large river and an offset downstream of the project site may provide less water quality benefit.) The highest preference for off-site mitigation and in lieu projects shall be given to locations that yield benefits to the same receiving water that received runoff from the original project site. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

46. Provide the reference to the ordinance or regulatory mechanism submitted above that establishes a minimum amount of storm water to be managed on-site as a first tier for off-site mitigation or payment in lieu. A higher offset ratio is required if off-site mitigation or payment in lieu is requested for the amount of storm water identified as the first tier. For example, a minimum of 0.4 inches of storm water runoff shall be managed on-site as a first tier. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

47. Provide the reference to the ordinance or regulatory mechanism submitted above that requires an offset ratio of 1:1.5 for the amount of storm water above the first tier (identified in Question 46) not managed on-site to the amount of storm water required to be mitigated at another site or for which in-lieu payments shall be made. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

48. Provide the reference to the ordinance or regulatory mechanism submitted above requiring that if demonstrated by the developer to the applicant that it is completely infeasible to manage the first tier of storm water identified in Question 47 on-site, the offset ratio for the unmanaged portion is 1:2. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

49. Provide the reference to the ordinance or regulatory mechanism submitted above that requires a schedule for completing off-site mitigation and in-lieu projects. Off-site mitigation and in-lieu projects should be completed within 24 months after the start of the original project site construction. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

50. Provide the reference to the ordinance or regulatory mechanism submitted above that requires that offsets and in-lieu projects be preserved and maintained in perpetuity, such as deed restrictions and long-term operation and maintenance. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

51. Describe the tracking system implemented, or to be implemented, to track off-site mitigation and/or in-lieu projects.

52. If there are any other exceptions to the performance standards (other than off-site mitigation and payment in lieu) being implemented or to be implemented during the permit cycle, provide the reference to the document submitted above describing the exception(s). The applicant shall demonstrate how the exception provides an equivalent or greater level of protection as the performance standards.

N/A

### **Site Plan Review**

53. Provide the reference to the ordinance or regulatory mechanism submitted above that includes a requirement to submit a site plan for review and approval of post-construction storm water runoff BMPs. If not available at this time, provide the date the ordinance or regulatory mechanism will be available.

[Appendix J – Stormwater Management Ordinance](#). [Appendix G](#). The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

54. Provide the reference to the procedure submitted above for site plan review and approval. If not available at this time, provide the date the procedure will be available.

[Appendix J – Stormwater Management Ordinance, Section 21-234](#). [Appendix G](#). The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

55. Provide the reference to the site plan review and approval procedure submitted above describing the process for determining how the developer meets the performance standards and ensures long-term operation and maintenance of BMPs in the attachment above. If not available at this time, provide the date the procedure will be available.

[Appendix J – Stormwater Management Ordinance, Section 21-234](#). [Appendix G](#). The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

### **Long-term Operation and Maintenance BMPs**

56. Provide the reference to the ordinance or regulatory mechanism submitted above that requires the long-term operation and maintenance of all structural and vegetative BMPs installed and implemented to meet the performance standards in perpetuity. If not available at this time, provide the date the procedure will be available.

[Appendix J - Stormwater Management Ordinance, Section 21-243](#). [Appendix G](#). The City currently follows the

OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

57. Provide the reference to the ordinance or regulatory mechanism submitted above that requires a maintenance agreement between the applicant and owners or operators responsible for the long-term operation and maintenance of structural and vegetative BMPs installed and implemented to meet the performance standards. If not available at this time, provide the date the procedure will be available.

[Appendix J - Stormwater Management Ordinance, Section 21-243.](#) [Appendix G.](#) The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

58. Does the maintenance agreement or other legal mechanism allow the applicant to complete the following?

- Inspect the structural or vegetative BMP
- Perform the necessary maintenance or corrective actions neglected by the BMP owner or operator
- Track the transfer of operation and maintenance responsibility of the BMP (e.g., deed restrictions)

If any of the boxes above were not checked, provide a response explaining how the maintenance agreement or other legal mechanism allows the applicant to verify and ensure maintenance of the BMP.

[Appendix J - Stormwater Management Ordinance, Section 21-243.](#) [Appendix G.](#) The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

59. Provide the reference to the procedure submitted above for tracking compliance with a maintenance agreement or other legal mechanism to ensure the performance standards are met in perpetuity in the attachment above.

[Appendix J - Stormwater Management Ordinance, Section 21-243.](#) [Appendix G.](#) The City currently follows the OCWRC Engineering Standards for Storm Water Facilities and intends to adopt the updated version once they are completed and approved by MDEQ.

## **Section 10. Pollution Prevention and Good Housekeeping Program**

The applicant shall describe the current and proposed BMPs to meet the minimum control measure requirements for the Pollution Prevention and Good Housekeeping Program to the maximum extent practicable, which shall be incorporated into the SWMP. The applicant shall develop and implement a Pollution Prevention and Good Housekeeping Program to prevent or reduce the discharge of pollutants from municipal facilities and operations.

The following definitions apply to the terms used below:

- Fleet: A group of vehicles owned or operated as a unit.
- Maintenance (includes, but not limited to): adding/changing vehicle fluids, fueling, lubrication, painting, mechanical repairs, parts degreasing, and vehicle/equipment washing.
- Storage Yard (includes, but not limited to): areas where vehicles are stored longer than overnight/weekend; areas where road maintenance materials are stored; areas where vehicle maintenance materials are stored; areas where chemicals in bulk are stored; areas where catch basin cleaning wastes are stored; and areas where maintenance equipment such as mowers, tractors, vector trucks, and sweepers is stored.

Please complete the questions below as appropriate. A "Not Applicable" response is appropriate in cases where the applicant does not own or operate a municipal facility or storm water structural control or does not perform the operation in the question. A measurable goal with a measure of assessment shall be included for each BMP, and, as appropriate, a schedule for implementation (months and years), including interim milestones and the frequency of the BMP. The responses shall reflect the nested MS4s identified in Section 4.

### **Pollution Prevention and Good Housekeeping Procedures**

Provide the procedures that describe the current and proposed BMPs to meet the minimum control measure requirements for the Pollution Prevention and Good Housekeeping Program to the maximum extent practicable as required below. It is recommended that files be separated and then converted to a PDF format before being attached below to meet the file size limit. For best results please upload one document at a time.

Attachment: Attach [Appendix H – P2GH General Procedures SOP](#), [Appendix H – Street Maintenance and](#)

Comment:

### **Municipal Facility and Structural Storm Water Control Inventory**

60. Provide the reference to the up-to-date inventory submitted above identifying applicant-owned or operated facilities and storm water structural controls with a discharge of storm water to surface waters of the state. The inventory shall include the location of each facility. Provide an estimate of the number of structural storm water controls throughout the entire MS4 for each applicable category below (e.g., 100 catch basins and 7 detention basins). For example, Attachment A, Page 3, Section B.

[Appendix H – P2GH General Procedures SOP, Table 1.](#)

Facilities that may have the high potential to discharge pollutants:

[Materials Storage and Public Works yards](#)

[Salt Storage Facilities](#)

Check all applicant-owned or operated facilities with a discharge of storm water to surface waters of the state:

[Administration buildings and libraries](#)

[Fire Stations](#)

[Police Stations](#)

Check all applicant-owned or operated structural storm water controls with a discharge of storm water to surface waters of the state:

[Catch Basins](#)

[Detention basins](#)

[Rain gardens](#)

[Secondary containment](#)

61. Provide the location where an up-to-date map (or maps) is available with the location of the facilities and structural storm water controls identified in Question 60. The location of the facilities and structural storm water controls may be included on the storm sewer system map maintained for the IDEP. The map (or maps) is available at the following location: (e.g., The Department of Public Works office)

[The Master Storm Sewer Map is updated regularly by the Engineering Consultant and current maps are available at City Hall and the Department of Public Works.](#)

62. Provide the reference to the procedure submitted above for updating and revising the inventory in Question 60 and map (or maps) identified in Question 61 as facilities and structural storm water controls are added, removed, or no longer owned or operated by the applicant in the attachment above. A suggested timeframe for updating/revising the inventory and map(s) is 30 days following adding/removing a facility or structural storm water control.

[Appendix H – P2GH General Procedures SOP, Section C](#)

### **Facility-Specific Storm Water Management**

63. Provide the reference to the procedure submitted above for assessing each facility identified in Question 60 for the potential to discharge pollutants to surface waters of the state. The procedure shall include a process for updating and revising the assessment.

A recommended timeframe for updating/revising the assessment is 30 days prior to discharging storm water from a new facility and within 30 days of determining a need to update/revise the facility assessment.

The applicant should consider the following factors when assessing each facility:

- Amount of urban pollutants stored at the site (e.g., sediment, nutrients, metals, hydrocarbons, pesticides, fertilizers, herbicides, chlorides, trash, bacteria, or other site-specific pollutants)
- Identification of improperly stored materials
- The potential for polluting activities to be conducted outside (e.g., vehicle washing)
- Proximity to waterbodies
- Poor housekeeping practices
- Discharge of pollutants of concern to impaired waters

If the applicant does not own a facility that discharges storm water to surface waters of the state in the urbanized area, skip to Question 71.

Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix H – P2GH General Procedures SOP, Section B](#)

64. Provide the reference to the list of prioritized facilities submitted above using the assessment in Question 63. Each facility shall be prioritized based on having the high, medium, or low potential to discharge pollutants to surface waters of the state. Facilities with the high potential for pollutant runoff shall include, but are not limited to, the applicant's fleet maintenance and storage yards. The applicant may choose to demonstrate how a fleet maintenance/storage yard has the low potential to discharge pollutants to surface waters of the state. If demonstrating a low potential, provide the reference to the demonstration submitted above for the fleet maintenance and/or storage yard.

[Appendix H – P2GH General Procedures SOP, Section D](#)

65. Is a site-specific standard operating procedure (SOP) available identifying the structural and non-structural storm water controls implemented and maintained to prevent or reduce pollutant runoff at each facility with the high potential for pollutant runoff? The SOP shall be available at each facility with the high potential for pollutant runoff and upon request from the MDEQ. The SOP shall identify the person responsible for oversight of the facility. The MDEQ may request the submission of the SOP during the application review process.

[Yes, a site specific SOP is available at each facility with the high potential for pollutant runoff](#)

66. Provide the reference in the SOP, for each facility with the high potential for pollutant runoff, to the following: the list of significant materials stored on-site that could pollute storm water; the description of the handling and storage requirements for each significant material; and the potential to discharge the significant material. (SOP Reference Example: DPW Yard SOP – Section 2)

[Appendix K - Department of Public Works Facility Storm Water Pollution Prevention Plan, Table 1. Appendix L – Cranbrook Education Community Salt Dame Area Pollution Incident Prevention Plan, Section 5.0](#)

67. Provide the reference in the SOP, for each facility with the high potential for pollutant runoff, identifying the good housekeeping practices implemented at the site. Good housekeeping practices include keeping the facility neat and orderly, properly storing and covering materials, and minimizing pollutant sources to prevent or reduce pollutant runoff. (SOP Reference Example: DPW Yard SOP – Section 2)

[Appendix K - Department of Public Works Facility Storm Water Pollution Prevention Plan, Section 5.](#)

[Appendix L – Cranbrook Education Community Salt Dame Area Pollution Incident Prevention Plan, Section 6.3.1 and Appendix C.](#)

68. Provide the reference in the SOP, for each facility with the high potential for pollutant runoff, to the description and schedule for conducting routine maintenance and inspections of storm water management and control devices to ensure materials and equipment are clean and orderly and to prevent or reduce pollutant runoff. A biweekly schedule is recommended for routine inspections. (SOP Reference Example: DPW Yard SOP – Section 2)

[Appendix K - Department of Public Works Facility Storm Water Pollution Prevention Plan, Section 5.](#)

[Appendix L – Cranbrook Education Community Salt Dame Area Pollution Incident Prevention Plan, Section 6.3.2 and Appendix B.](#)

69. Provide the reference in the SOP, for each facility with the high potential for pollutant runoff, to the description and schedule for conducting a comprehensive site inspection at least once every six months. The comprehensive inspection shall include an inspection of all structural storm water controls and a review of non-structural storm water controls to prevent or reduce pollutant runoff. (SOP Reference Example: DPW Yard SOP – Section 2)

[Appendix K - Department of Public Works Facility Storm Water Pollution Prevention Plan, Section 5.](#)

[Appendix L – Cranbrook Education Community Salt Dame Area Pollution Incident Prevention Plan, Section 6.3.2 and Appendix B. The schedule for the salt dome and brine tank inspections are indicated in the SWPPP.](#)

70. Provide the reference to the procedure submitted above identifying the BMPs currently implemented or to be implemented during the permit cycle to prevent or reduce pollutant runoff at each facility with the medium and

lower potential for the discharge of pollutants to surface waters of the state using the assessment and prioritized list in Questions 63 and 64.

[Appendix H – P2GH General Procedures SOP, Section D](#)

### **Structural Storm Water Control Operation and Maintenance Activities**

71. Provide the reference to the procedure submitted above for prioritizing each catch basin for routine inspection, maintenance, and cleaning based on preventing or reducing pollutant runoff. The procedure shall include assigning a priority level for each catch basin and the associated inspection, maintenance and cleaning schedule based on preventing or reducing pollutant runoff. The procedure shall include a process for updating/revising the priority level for a catch basin giving consideration to inspection findings and citizen complaints. A recommended timeframe for updating/revising the procedure is 30 days following the construction of a catch basin or a change in priority level. If the applicant does not own or operate catch basins skip to Question 75.

[Appendix H – P2GH General Procedures SOP, Section G](#)

72. Provide the reference to the narrative description or map submitted above with the geographic location of the catch basins in each priority level.

[Appendix H – P2GH General Procedures SOP, Section F](#)

73. Provide the reference to the procedure submitted above for inspecting, cleaning, and maintaining catch basins to ensure proper performance. Proper cleaning methods include ensuring accumulated pollutants are not discharged during cleaning and are removed prior to discharging to surface waters of the state. An MDEQ Catch Basin Cleaning Activities guidance document is available at the following link.

Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix H – P2GH General Procedures SOP, Section G](#)

74. Provide the reference to the procedure submitted above for dewatering, storage, and disposal of materials extracted from catch basins. An MDEQ Catch Basin Cleaning Activities guidance document is available at the following link.

Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix H – P2GH General Procedures SOP, Section H](#)

75. If the applicant owns or operates structural storm water controls identified in Question 60, excluding the structural storm water controls included in an SOP as part of Question 65 and catch basins, provide the reference to the procedure submitted above for inspecting and maintaining the structural storm water controls. The procedure shall include a description and schedule for inspecting and maintaining each structural storm water control and the process for disposing of maintenance waste materials. The procedure shall require that controls be maintained to reduce to the maximum extent practicable the contribution of pollutants to storm water. The procedure shall include a process for updating/revising the procedure to ensure a maintenance and inspection program for each structural storm water control. A recommended timeframe for updating/revising the procedure is 30 days following the implementation of a new structural storm water control.

[Appendix H – P2GH General Procedures SOP, Section J](#)

76. Provide the reference to the procedure submitted above requiring new applicant-owned or operated facilities or new structural storm water controls for water quantity be designed and implemented in accordance with the post-construction storm water runoff control performance standards and long-term operation and maintenance requirements.

[Appendix H – P2GH General Procedures SOP, Section K](#)

### **Municipal Operations and Maintenance Activities**

77. Provide the reference to the procedure(s) submitted above with the assessment of the following operation and maintenance activities, if applicable, for the potential to discharge pollutants to surface waters of the state. The assessment shall identify all pollutants that could be discharged from each applicable operation and maintenance activity and the BMPs being implemented or to be implemented to prevent or reduce pollutant

runoff. The procedure shall include a process for updating and revising the assessment. A suggested timeframe for updating/revising the assessment is 30 days following adding/removing BMPs to address new and existing operation and maintenance activities.

[Road, parking lot, and sidewalk maintenance \(e.g., pothole, sidewalk, and curb and gutter repair\)](#)

[Bridge Maintenance](#)

[Right-of-way Maintenance](#)

[Unpaved Road Maintenance](#)

[Cold Weather Operations \(e.g., plowing, sanding, application of deicing agents, and snow pile disposal\)](#)

[Vehicle washing and maintenance of applicant-owned vehicles \(e.g., police, fire, school bus, public works\)](#)

Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix H - P2GH General Procedures SOP, Section E.](#)

[Appendix H - Street Maintenance and Winter Operations SOP](#)

78. Provide the reference to the procedure submitted above for prioritizing applicant-owned or operated streets, parking lots, and other impervious infrastructure for street sweeping based on the potential to discharge pollutants to surface waters of the state. The procedure shall include assigning a priority level for each parking lot and street and the associated cleaning schedule (i.e., sweeping frequency and timing) based on preventing or reducing pollutant runoff. The procedure shall include a process for updating/revising the priority level giving consideration to street sweeping findings and citizen complaints. A recommended timeframe for updating/revising the prioritization is 30 days following the construction of a new street, parking lot, or other applicant-owned or operated impervious surface or within 30 days of identifying a need to revise a priority level. If the applicant does not own or operate any streets, parking lots, or other impervious infrastructure, skip to Question 82.

[Appendix H – P2GH General Procedures SOP, Section I](#)

79. Provide the reference to the narrative description or map submitted above with the geographic location of the streets, parking lots, and other impervious surfaces in each priority level.

[Appendix H – P2GH General Procedures SOP, Section I](#)

80. Provide the reference to the procedure submitted above identifying the sweeping methods based on the applicant's sweeping equipment and use of additional resources in sweeping seasonal leaves or pick-up of other materials. Proper sweeping methods include operating sweeping equipment according to the manufacturers' operating instructions and to protect water quality.

[Appendix H – P2GH General Procedures SOP, Section I](#)

81. Provide the reference to the procedure submitted above for dewatering, storage, and disposal of street sweeper waste material. An MDEQ Catch Basin Cleaning Activities guidance document is available at the following link and includes information on street sweeping requirements. Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix H – P2GH General Procedures SOP, Section H](#)

### **Managing Vegetated Properties**

82. If the applicant's pesticide applicator does not exclusively use ready-to-use products from the original container, provide the reference to the procedure submitted above requiring the applicant's pesticide applicator to be certified by the State of Michigan as an applicator in the applicable category, to prevent or reduce pollutant runoff from vegetated land. A description of the certified applicator categories is available at the following link. If the applicant only applies ready-to-use products from the original container, enter "Not Applicable." Provide the reference to the procedure submitted above (page and paragraph of attachments): e.g., Attachment A, Section b.

[Appendix H – P2GH General Procedures SOP, Section L.](#) The City does not spread fertilizers, herbicides, or pesticides on City properties. If a product is used (i.e. weed killer or insect spray) a ready-to-use product is used.

### **Contractor Requirements and Oversight**

83. Provide the reference to the procedure submitted above requiring contractors hired by the applicant to perform municipal operation and maintenance activities comply with all pollution prevention and good

housekeeping BMPs as appropriate. The procedure shall include the process implemented for providing oversight of contractor activities to ensure compliance.

[Appendix H – P2GH General Procedures SOP, Section N](#)

### **Employee Training**

84. Provide the reference to the employee training program submitted above to train employees involved in implementing or overseeing the pollution prevention and good housekeeping program. The program shall include the training schedule. At a minimum, existing staff shall be trained once during the permit cycle and within the first year of hire for new staff.

[Appendix H – P2GH General Procedures SOP, Section M.](#)

[Appendix K – Department of Public Works Facility Storm Water Pollution Prevention Plan, Section 5.6](#)

## **Section 11. Total Maximum Daily Load Implementation Plan**

The following questions address discharges to impaired waters with a United States Environmental Protection Agency (USEPA) approved Total Maximum Daily Load (TMDL) that includes a pollutant load allocation assigned to the applicant's MS4. BMPs shall be implemented to reduce the discharge of the TMDL pollutant from the MS4 to make progress in meeting Water Quality Standards. Applicable TMDLs are TMDLs approved prior to the applicant being notified of the need to apply for permit reissuance. Applicable TMDLs for the applicant were provided in the application notice letter.

The applicant shall describe the current and proposed BMPs to meet the minimum requirements for the TMDL Implementation Plan, which shall be incorporated into the SWMP. Please indicate in your response, if you are or will be working collaboratively with watershed or regional partners on any or all activities in the TMDL Implementation Plan during the permit cycle. The following questions represent the minimum requirements for a TMDL Implementation Plan. Please complete the following questions as appropriate. A measurable goal with a measure of assessment shall be included for each BMP, and, as appropriate, a schedule for implementation (months and years), including interim milestones and the frequency of the BMP. The responses shall reflect the nested MS4s identified in Section 4.

### **Total Maximum Daily Load Implementation Plan**

Provide the procedures that describe the current and proposed BMPs to meet the minimum control measure requirements for the TMDL Implementation Plan to the maximum extent practicable as required below. It is recommended that files be separated and then converted to a PDF format before being attached below to meet the file size limit. For best results please upload one document at a time.

Attachment: [Appendix I - Collaborative Total Maximum Daily Load Implementation Plan](#)

Comment:

Proposing to work collaboratively on any or all activities in the TMDL Implementation Plan during the permit cycle. [Yes](#)

85. If a TMDL(s) was included in the applicant's application notice, provide the name(s) below. If no TMDL was identified, skip to the next section.

[Appendix I - Rouge River Collaborative TMDL, Section A.](#)

[Rouge River Watershed – E. coli](#)

[Rouge River Watershed – Biota](#)

86. Provide the reference to the procedure submitted above describing the process for identifying and prioritizing BMPs currently being implemented or to be implemented during the permit cycle to make progress toward achieving the pollutant load reduction requirement in each TMDL identified in Question 85. The procedure shall include a process for reviewing, updating, and revising BMPs implemented or to be implemented to ensure progress in achieving the TMDL pollutant load reduction.

[Appendix I - Rouge River Collaborative TMDL, Section C.](#)

87. Provide the reference to the TMDL BMP Priority List submitted above with prioritized BMPs currently being implemented or to be implemented during the permit cycle to make progress toward achieving the pollutant load reduction requirement in each TMDL identified in Question 85. Each BMP shall include a reference to the

targeted TMDL pollutant.

[Appendix I - Rouge River Collaborative TMDL, Section D.](#)

88. Provide the reference to the TMDL Monitoring Plan submitted above for assessing the effectiveness of the BMPs currently being implemented, or to be implemented, in making progress toward achieving the TMDL pollutant load reduction requirement, including a schedule for completing the monitoring. Monitoring shall be specifically for the pollutant identified in the TMDL. Monitoring may include, but is not limited to, outfall monitoring, in-stream monitoring, or modeling. At a minimum, monitoring shall be conducted two times during the permit cycle or at a frequency sufficient to determine if the BMPs are adequate in making progress toward achieving the TMDL pollutant load reduction. Existing monitoring data may be submitted for review as part of the plan to meet part of the monitoring requirement.

[Appendix I - Rouge River Collaborative TMDL, Section E.](#)

**APPENDIX A**  
**Outfall and Point of Discharge Information**

**City of Bloomfield Hills  
Municipal Separate Storm Sewer System  
Outfalls**

<b>Outfall No.</b>	<b>Location</b>	<b>Type</b>	<b>Receiving Waters</b>
10-1	2565 Lahser Road	Outfall	Rouge River, Main 1-2
10-2	260 Woodwind Drive	Outfall	Rouge River, Main 1-2
10-3	224 Woodwind Drive	Outfall	Rouge River, Main 1-2
10-4	200 Woodwind Drive	Outfall	Rouge River, Main 1-2
10-5	186 Woodwind Drive	Outfall	Rouge River, Main 1-2
10-6	180 Woodwind Drive	Outfall	Rouge River, Main 1-2
10-7	323 Pine Ridge Drive	Outfall	Rouge River, Main 1-2
10-8	294 Pine Ridge Drive	Outfall	Rouge River, Main 1-2
10-9	250 Pine Ridge Drive	Outfall	Rouge River, Main 1-2
10-10	250 Pine Ridge Drive	Outfall	Rouge River, Main 1-2
10-11	250 Pine Ridge Drive	Outfall	Rouge River, Main 1-2
10-12	22 Manorwood Drive	Outfall	Rouge River, Main 1-2
10-13	404 Balfour Drive	Outfall	Rouge River, Main 1-2
10-14	37 Pine Gate	Outfall	Rouge River, Main 1-2
10-15	15 Pine Gate	Outfall	Rouge River, Main 1-2
11-1	2463 Hunters Pond	Outfall	Rouge River, Main 1-2
11-2	2451 Hunters Pond	Outfall	Rouge River, Main 1-2
14-1	45 E. Long Lake Road	Discharge Point	Rouge River, Main 1-2
14-2	45 E. Long Lake Road	Discharge Point	Rouge River, Main 1-2
14-3	1805 Kensington Road	Discharge Point	Rouge River, Main 1-2
14-4	70 Denbar Road	Outfall	Rouge River, Main 1-2
14-5	33 Bloomfield Hills Parkway	Outfall	Rouge River, Main 1-2
14-6	39400 Woodward Avenue	Outfall	Rouge River, Main 1-2
14-7	190 E. Long Lake Road	Outfall	Rouge River, Main 1-2
14-8	200 E. Long Lake Road	Outfall	Rouge River, Main 1-2
14-9	200 E. Long Lake Road	Outfall	Rouge River, Main 1-2
14-10	200 E. Long Lake Road	Outfall	Rouge River, Main 1-2
14-11	1780 Kensington Road	Outfall	Rouge River, Main 1-2
14-12	1811 Lakeview Court	Outfall	Rouge River, Main 1-2
14-13	1635 Hillwood Drive	Outfall	Rouge River, Main 1-2
14-14	1305 Kensington Road	Outfall	Rouge River, Main 1-2
15-1	1781 Rathmor Road	Outfall	Rouge River, Main 1-2
15-2	1343 Orchard Ridge Road	Discharge Point	Rouge River, Main 1-2
15-3	1310 Orchard Ridge Road	Discharge Point	Rouge River, Main 1-2
15-4	1299 Orchard Ridge Road	Outfall	Rouge River, Main 1-2
15-5	1011 Orchard Ridge Road	Outfall	Rouge River, Main 1-2
15-6	1350 Country Club Drive	Outfall	Rouge River, Main 1-2
15-7	7 Vaughan Crossing	Outfall	Rouge River, Main 1-2
15-8	Barbour Lane	Outfall	Rouge River, Main 1-2
15-9	303 Barden Road	Outfall	Rouge River, Main 1-2
15-10	303 Barden Road	Outfall	Rouge River, Main 1-2
15-11	321 Barden Road	Outfall	Rouge River, Main 1-2
15-12	Country Club Road & Valley Way	Outfall	Rouge River, Main 1-2
15-13	Country Club Road & Valley Way	Outfall	Rouge River, Main 1-2
22-1	Vaughan Road & Orchard Ridge S	Outfall	Rouge River, Main 1-2

**City of Bloomfield Hills  
Municipal Separate Storm Sewer System  
Outfalls**

<b>Outfall No.</b>	<b>Location</b>	<b>Type</b>	<b>Receiving Waters</b>
22-2	Vaughan Road & Orchard Ridge S	Outfall	Rouge River, Main 1-2
22-3	672 Vaughan Road	Outfall	Rouge River, Main 1-2
22-4	651 Orchard Ridge Road	Outfall	Rouge River, Main 1-2
22-5	480 Thetford Lane	Discharge Point	Rouge River, Main 1-2
23-1	Cranbrook Road Bridge	Outfall	Rouge River, Main 1-2
23-2	Cranbrook Road Bridge	Outfall	Rouge River, Main 1-2
23-3	Brady Lane Bridge	Outfall	Rouge River, Main 1-2
23-4	Brady Lane Bridge	Outfall	Rouge River, Main 1-2
23-5	150 Linda Lane	Outfall	Rouge River, Main 1-2
23-6	131 Linda Knoll	Outfall	Rouge River, Main 1-2
23-7	265 Warrington Road	Outfall	Rouge River, Main 1-2
23-8	232 Charing Cross Court	Outfall	Rouge River, Main 1-2
23-9	161 Lone Pine Road	Outfall	Rouge River, Main 1-2
23-10	418 Cranbrook Court	Outfall	Rouge River, Main 1-2
23-11	320 Cranbrook Court	Outfall	Rouge River, Main 1-2
23-12	Lone Pine Road & Cranbrook Road	Outfall	Rouge River, Main 1-2
23-13	394 Cranbrook Road	Outfall	Rouge River, Main 1-2
23-14	116 Chesterfield Road	Discharge Point	Rouge River, Main 1-2
23-15	146 Endicott Road	Outfall	Rouge River, Main 1-2

**APPENDIX B**  
**Enforcement Response Procedure**

# STANDARD OPERATING PROCEDURE ENFORCEMENT RESPONSE

THE CITY OF BLOOMFIELD HILLS  
45 E. LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN 48304



MARCH 2016

## **SECTION A – PURPOSE**

The Michigan Department of Environmental Quality (MDEQ) National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase II Stormwater Discharge Permit Application requires a procedure for Enforcement Response to address violations of the ordinance(s) or regulatory mechanism(s) identified in the Stormwater Management Plan.

## **SECTION B – GENERAL PENALTY**

Chapter 5 of Part 1 Charter of the City of Bloomfield Hills Code of Ordinances defines the penalties levied by the City for ordinance violations. The section specifically defines penalties for violations of ordinances.

### **Chapter 5, Section 6 – Penalties for violations of ordinances**

*“The commission shall have authority to provide in any ordinance for the punishment of those who violate the same, by a fine not exceeding five hundred dollars or imprisonment for a period not exceeding ninety days, or both, in the discretion of the court. Such ordinance may further provide that in case any person shall fail to pay any fine so imposed, that he may be imprisoned until such fine shall be paid, provided that no person shall be imprisoned for a single violation of any ordinance for a longer period than ninety days. Such imprisonment may be in the city prison, if any, in the county jail of Oakland County, or in any penal institution in the state authorized by law to receive prisoners from the city.”*

## **SECTION C – Ordinances**

### **PART 91 MUNICIPAL ENFORCEMENT AGENCY**

The City of Bloomfield Hills is an approved Municipal Enforcement Agency under the Part 91 of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as Amended. As an enforcing agency, the City is responsible for implementing and enforcing their Grading and Soil Erosion Control Ordinance.

#### **C.1 Chapter 17, Article III, Section 17-30 – Enforcing Agency**

*“The city building department shall be the municipal enforcing agency responsible for administering and enforcing Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (“Part 91”), within the municipal limits of the city.”*

#### **C.2 Chapter 17, Article III, Section 17-35 - .36.090 – Site Inspection**

- a. *“The building official, or his or her designee, shall inspect earth change sites to ensure compliance with the requirements of Part 91 and this article. Site inspections shall occur at a frequency necessary to ensure compliance with Part 91 and this article, but will always be at a minimum, at the beginning of construction,*

*during construction, and at the end of the project. The building official, or his designee, may utilize all compliance and enforcement actions authorized in Part 91 and the rules to bring sites into compliance with Part 91 and this article.”*

- b. *“The costs incurred by the city for any inspections that are necessary due to other violations requiring the city to construct, implement and maintain soil erosion and sedimentation controls on the property and for which the escrow is insufficient to cover, due to a failure to remit payment pursuant to this section, shall constitute a lien against the property for which the permit was issued, which lien shall have the force, effect and priority as provided under Part 91.”*

**C.3 Chapter 17, Article III, Section 17-40 – Penalties**

*Violations of this article shall be punishable as a municipal civil infraction. Each day on which a violation of this article exists shall be deemed to constitute a separate offense.*

**C.4 Chapter 21, Article IV, Stormwater Management**

**C.5 Chapter 21, Article V, Municipal Separate Storm Sewer System**

**C.6 Post-Construction Ordinance**

The City intends to adopt the Oakland County Water Resources Commissioner (OCWRC) Engineering Standards for Storm Water Facilities (storm water management and water quality) once they have been revised and approved by EGLE. The OCWRC standards would take effect at the time the MS4 Permit goes into effect.

**C.7 Illicit Discharges and Connections**

Illicit discharges and connections are to be corrected within 30 days of notice of violation (as practicable) as will be identified in city’s IDEP draft ordinance.

**SECTION D – ENFORCEMENT TRACKING**

City will track all violations and issued permits. The following information will be collected and used for tracking records for each violation that is imposed by the City.

1. Name
2. Date
3. Location of the Violation (address, cross streets, etc.)
4. Business, Agency, Organization as applicable
5. Description of the Violation
6. Applicable Correspondence
7. Follow-up Actions
8. Key Dates
9. Descriptions of the City’s Enforcement Response

10. Schedules for Achieving Compliance
11. Date the Violation was Resolved

### **SECTION E – PROCESS FOR REVISION**

Any questions on this policy and procedure should be directed to the Stormwater Manager or the City Manager. This procedure shall be reviewed once per permit cycle by the Stormwater Manager for any updates to streamline the requirements.

**APPENDIX C**

**Collaborative Public Participation/Involvement Program (PPP)**

**Click [here](#) for link to Collaborative PPP Plan**

**APPENDIX D**

**Collaborative Public Education Program (PEP)**

Click [here](#) for link to Collaborative PEP Plan

**APPENDIX E**

**Collaborative Illicit Discharge Elimination Plan (IDEP)**

Click [here](#) for link to Collaborative IDEP

**APPENDIX F**  
**Construction Stormwater Runoff Control**

# STANDARD OPERATING PROCEDURE CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

THE CITY OF BLOOMFIELD HILLS  
45 E. LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN 48304



MARCH 2016

## **SECTION A – PURPOSE**

The Michigan Department of Environmental Quality (MDEQ) National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase II Stormwater Discharge Permit Application requires a description of current and proposed BMPs to meet the minimum control measure requirements for the construction stormwater runoff control program to the maximum extent practicable. The City of Bloomfield Hills administers a Part 91 program and is a designated municipal enforcement agency. The following standard operating procedure provides a description of the procedures the City employs for construction site runoff control that includes notification procedures and ensuring proper permits are obtained by those disturbing greater than one acre of soil.

## **SECTION B – APPLICATION PROCEDURE**

Prior to any earth disturbance, the City of Bloomfield Hills will ensure that construction activity one acre or greater in total earth disturbance with the potential to discharge to the MS4 does obtain a Part 91 Permit and/or a State of Michigan Permit by Rule or is reviewed by an approved Authorized Public Agency through the site plan review process. These requirements are documented in both the City's Building Code and Grading and Soil Erosion Control Ordinances.

### **B.1 Chapter 17, Article III, Section 17-32 – Submission of Plan**

*“Before undertaking any earth change activity in the city that disturbs one (1) or more acres of land, is on a parcel or parcels adjacent to a public street, or is within five hundred (500) feet of waters of the state as defined by Act 51, unless exempted in Part 91 or the rules, the landowner shall secure a soil erosion and sedimentation control permit from the city. Prior to receiving the permit, the landowner shall submit a soil erosion and sedimentation control application to the city in accordance with the rules adopted in this article.”*

### **B.2 Chapter 17, Article III, Section 17-38 – Modification of approved plans**

*“Any modification of an approved plan must be submitted to and approved by the city prior to commencement of the changes being proposed. All necessary supplemental reports shall be submitted with the proposal to modify the approved plan. No work in connection with any proposed modification shall be permitted without the prior approval of the city.”*

## **SECTION C – INSPECTIONS/COMPLAINTS**

As the Part 91 regulating authority, the City will inspect active construction sites that have obtained a Soil Erosion and Sedimentation Control Permit from the City.

### **C.1 Chapter 17, Article III, Section 17-35 – Inspection Requirements**

*“The building official, or his or her designee, shall inspect earth change sites to ensure compliance with the requirements of Part 91 and this article. Site inspections shall occur at a frequency necessary to ensure compliance with Part 91 and this article, but will always be at a minimum, at the beginning of construction, during construction, and at*

*the end of the project. The building official, or his designee, may utilize all compliance and enforcement actions authorized in Part 91 and the rules to bring sites into compliance with Part 91 and this article.”*

## **C.2 Chapter 17, Article III, Section 17-40 – Penalties**

*“Violations of this article shall be punishable as a municipal civil infraction. Each day on which a violation of this article exists shall be deemed to constitute a separate offense.”*

Complaints regarding soil erosion and sedimentation issues made by the public will be forward to the City Building Official. At that time, the City Building Official will direct a site inspection to document any violations of the soil erosion and sedimentation/grading permit within 48 hours and pursue enforcement actions as appropriate. See the Enforcement Response Procedure for a summary of the enforcement protocols to ensure compliance with the City’s Part 91 program.

## **SECTION D – MEASUREABLE GOALS**

To demonstrate the effectiveness of the City’s Part 91 program, the following metrics will be tracked for reporting purposes:

- Number of Part 91 related complaints received.
- Number of Part 91 permits issued by the City.
- Number of enforcement actions taken to achieve compliance with the City’s Part 91 program.

These metrics will be tracked over the reporting cycle that is specified in the City’s Certificate of Coverage for the MS4 Permit.

## **SECTION E – REPORTABLE DISCHARGES**

The City will not report instances of *de minimis* soil discharges to MDEQ. For instances where the discharge of sediment cannot be immediately contained on site, or if there are other pollutants that include pesticides, petroleum derivatives, construction chemicals, and solid waste associated with the discharge in quantities that are consistent with the spill response plan as defined in Appendix H of the Storm Water Management Plan (SWMP), the City will notify the MDEQ through the Pollution Emergency Alert System (PEAS) at 1-800-292-4706.

## **SECTION F –STATE OF MICHIGAN PERMIT BY RULE**

The City shall advise the landowner or recorded easement holder of the State of Michigan Permit by Rule (Rule 323.2190) for storm water discharge from construction activity if the area of the disturbance is greater than 5 acres. These criteria will be identified during the site plan review process and will be included in correspondence with the landowner as appropriate.

## **SECTION G – PROCESS FOR REVISION**

Any questions on this policy and procedure should be directed to the Stormwater Manager or the City Manager. This procedure shall be reviewed once per permit cycle by the Stormwater Manager for any updates to streamline the requirements.

**APPENDIX G**  
**Post-Construction Stormwater Runoff Program**

**OAKLAND COUNTY  
WATER RESOURCES COMMISSIONER**

**ENGINEERING DESIGN STANDARDS  
FOR STORM WATER FACILITIES**

**Requirements, Rules and Design Criteria for  
Storm Water Management**



**January 1, 2006  
Revised March 27, 2015**

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- Act 288 of the Public Acts of 1967, as amended, is known as the Subdivision Control Act of 1967 (the "Plat Act"). All subdivision plats to be recorded with the County Register of Deeds must conform to this Act. Under the Plat Act, the Water Resources Commissioner is required to review and approve the storm water drainage for the plat.
- The provisions of Section 192 of the Plat Act include:
  - a. That the Proprietor provides for adequate storm water facilities within the lands proposed for platting and outlets thereto.
  - b. That the Proprietor provide adequate storm water retention basins where deemed necessary.
- The rules presented herein, with the authority provided for in Section 105, sub-section (c) of the Plat Act, are issued to guide land developers, engineers and surveyors interested in developing land in Oakland County and to provide for a uniform method of preparing plats and construction plans submitted to the office of the Oakland County Water Resources Commissioner for review and approval.
- The Plat Act gives the Water Resources Commissioner the authority to require that County Drains and natural water courses, both inside and outside the plat boundaries, be improved to the standards established by the Water Resources Commissioner when deemed necessary.
- The Water Resources Commissioner will also require that an appropriate entity be responsible for the perpetual maintenance of all storm water drainage facilities within the plat or the storm drainage system may be established as a County Drain, at the Proprietor's expense, to insure adequate maintenance.
- The rules presented herein will also apply to:
  - Mobile home development plans submitted to the Water Resources Commissioner under Act 96 of the Public Acts of 1987
  - Site development plans that require review and approval by the Water Resources Commissioner's office
  - Site condominium development plans prepared under Act 59 of the Public Acts of 1978 that require review and approval by the Water Resources Commissioner's office
  - Private storm drain systems that are to be established as a County Drain under Chapter 18 of the Drain Code.
  - Any other storm drainage system review requested to be performed by the Water Resources Commissioner's office.
- These rules are the minimum design standard accepted by this office. In addition to the rules herein, the Proprietor must also abide by the rules, standards, specifications and master plan of the municipality where the site is located. In the case where conflicting standards arise, the more stringent requirements will govern.
- These rules will be revised as necessary with the most recently dated sheets being applicable.
- These storm water standards are intended to generally comply with the requirements of the Phase II National Pollutant Discharge Elimination System Storm Water Regulations, however, more stringent storm water standards may be required to meet the goals and objectives of State of Michigan approved Watershed Management Plans. Storm water Best Management Practices should be incorporated to the maximum extent practicable as required.

## DEFINITIONS

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**BMP**-Best Management Practice – Structural device, measure, facility or activity that helps to achieve storm water management control objectives at a designated site. Ex: A detention basin is a BMP.

**Commissioner** - The Water Resources Commissioner of the County of Oakland, State of Michigan.

**County Drain**- The Water Resources Commissioner of Oakland County, through legislative enactment, has acquired jurisdiction over a storm water conveyance system. Ex: An enclosed drain or an open watercourse.

**Design Storm**- The rain storm used as the basis of design for storm water drainage facilities.

**Detention Basin**- A reservoir or structure that stores storm water and releases it at a controlled rate.

**Drainage Area**- The area of land that has runoff tributary to a specific point.

**Drainage System**- All storm drainage facilities within a site, including storm drains, detention basins, swales and channels.

**Easement**- A right afforded to a person or entity to make limited use of another's real property.

**Engineer** - The Engineer of the Office of the Oakland County Water Resources Commissioner.

**Forebay**- A pond-like structure that pre-treats storm water runoff to remove pollutants, predominantly sand, dirt and silt, before discharging into an adjacent storm water pond.

**Freeboard**- The space between the high water elevation and the top of bank of a storm water pond or storage structure.

**Hydrograph**- A graph of discharge or flow rate as a function of time.

**Infiltration**- A process whereby precipitation seeps into the ground.

**In-line Basin**- A storm water reservoir constructed within a watercourse.

**Low-Flow Channel**- A small swale within a basin designed to convey the runoff from a small rain event through the basin in a manner that will facilitate infiltration.

**Precipitation**- Any water or ice with sufficient mass that it falls to the earth.

**Proprietor** - Any person, firm, association, partnership, corporation, or combination of any one of them.

**Retention Basin**- A reservoir that stores storm water without releasing it. The storm water ultimately evaporates or infiltrates into the ground.

**Runoff**- Precipitation that flows over land.

**Storm Drain**- A pipe, conduit or open watercourse that conveys storm water.

**Surcharge**- A condition in which the water level in a storm drain rises above the crown of the conduit.

**Swale**- A natural or constructed wide, shallow ditch that conveys storm water.

**Watercourse**- A natural or artificial channel for flowing water.

**Watershed**- Area of land that drains to a single outlet and is separated from other watersheds by a divide.

**100-yr Storm**- A rainstorm that has a 1% chance of occurring in a year.

**10-yr Storm**- A rainstorm that has a 10% chance of occurring in a year.

# PROCEDURES FOR SUBMITTAL AND REVIEW

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## I. APPLICATION FOR REVIEW

An application for review must accompany all plans submitted to WRC for review. The application shall be submitted by the Owner/Developer or the Design Engineer on behalf of the Owner/Developer. Application for review shall be made prior to the start of any work requiring a permit from WRC.

For project sites that will be developed in phases an application is required for the initial work and new applications will be required for additional work not indicated on the original application.

A minimum, non-refundable, up-front application fee is required for certain developments. The total review and permit fees will be determined upon completion of the review.

The review period begins upon the receipt of a completed application, plans and fees.

## II. SUBDIVISIONS- Sites to be platted under Act 288

### A. Preliminary Plat

#### 1. General Requirements

A preliminary or tentative plan showing the layout of the area intended to be platted shall be submitted by the Proprietor. This plan shall be prepared under the direction of and sealed by a registered professional engineer or a registered land surveyor. The plan shall be drawn to a standard engineering scale no smaller than 1" = 100' and the sheet(s) of paper must not be larger than 24" x 36". This preliminary plan is what the Subdivision Control Act of 1967 refers to in Section 111 as a "preliminary plat".

Section 114, Sub-section (3) of the Subdivision Control Act of 1967 requires that the Water Resources Commissioner approve or reject preliminary plats within 30 days of their receipt.

Three copies of the preliminary plat, prepared in accordance with the following requirements, shall be submitted with a letter of transmittal requesting that the preliminary plan be reviewed and, if found satisfactory, approved. The names of the Proprietor and engineering or surveying firm with mailing addresses, telephone and fax numbers for each shall be included with the transmittal.

The preliminary plat shall include:

- a. The location of the proposed subdivision with reference to the section and part of section in which the parcel is situated, the name of the township, city or village, a proposed legal description of the site, the number of acres proposed to be platted and a location map with north arrow.
- b. The proposed street and alley layout and approximate lot and plat dimensions.
- c. All on-site and off-site pertinent factors, the existence and description of which might be of value in determining the overall requirements for the subdivision, such as:
  - Adjoining roads, subdivisions and parcels
  - Railroads
  - High-tension tower lines, under ground transmission lines and gas pipelines
  - Cemeteries and parks
  - Rivers, natural water courses, county drains, lagoons, slips, waterways, streams, lakes, bays, canals, wetlands, wetland boundaries and floodplains
  - Existing utilities; storm drains, sanitary sewers, water main, telephone, cable or fiber optic lines
  - Existing and proposed easements

- d. Contour information in two-foot intervals with North American Vertical Datum of 1988 (NAVD 88), or most current national datum, shall be shown on the same plan, otherwise it shall be submitted on a separate sheet.
- e. A drainage map, using a United States Geological Survey (USGS) topographic map, or equivalent, that shows the existing drainage area and flow patterns and indicates the proposed drainage pattern.

Inasmuch as improper utility easement location can result in a change in plat layout, the Proprietor is advised to consult with the respective utility companies before presentation of the preliminary plan for approval.

In the case where the Proprietor wishes to subdivide a given area but wishes to begin with only a portion of the total area, the original plan shall include the proposed general layout for the entire area. The part that is proposed to be subdivided first shall be clearly superimposed upon the overall plan in order to illustrate clearly the method of development which the Proprietor intends to follow. Each subsequent plat shall follow the same procedure until the entire area controlled by the Proprietor is subdivided. The final acceptance of a subdivision that is a partial development of a larger general layout does not automatically insure the final acceptance of the overall layout. The intent is to permit some flexibility in the overall layout if future conditions make it desirable or necessary to make any changes.

If the proposed preliminary plan as submitted meets with all the requirements, one approved copy of the preliminary plan will be returned. Approval of the preliminary plan is recommended before proceeding with the preparation of final construction plans. If the proposed plan is not approved as originally submitted, the Commissioner notifies the Proprietor in writing setting forth the reasons for withholding approval and requests that the necessary changes be made and the revised layout resubmitted.

In accordance with Section 560.120 of Act 288, the preliminary plat approval is valid for two years. If construction plans have not been submitted within that time, a new preliminary plat must be submitted and approved. The two-year period may be extended if applied for by the proprietor and approved by the Water Resources Commissioner in writing.

## 2. *Drainage Requirements*

The preliminary plan must include the general drainage scheme for the proposed subdivision, or the plan will be rejected. The general drainage scheme shall indicate how storm drainage will be provided and where it will outlet. Preliminary calculations for detention and contributing off-site flow must be included on the plan.

Drainage proposed for subdivisions shall conform to established County Drain districts, existing natural drainage patterns and community master plans. The design shall consider the effect that the drainage proposed in the subdivision has upon the entire drainage basin.

The preliminary plan shall indicate in general, on a USGS topographic map, any drainage originating outside of the subdivision limits which has previously flowed onto or across the subdivision, as well as any natural watercourses and County Drains that traverse or abut the subdivision.

The preliminary plan shall indicate in general any proposed onsite and/or offsite facilities, proposed or existing, required to conduct the drainage to an adequate outlet.

The Water Resources Commissioner's office is not responsible for roadside ditches. Road drainage ditches are under the jurisdiction of the Road Commission for Oakland County (RCOC) or other authority. Any drainage plan that proposes to outlet storm water to a road ditch must be approved by the RCOC or authority that has jurisdiction.

The Water Resources Commissioner shall require that the developer provide assurance of adequate maintenance and inspection of the installation of both the external and internal storm drainage facilities.

### 3. *Easement Requirements*

The following minimum easement widths are required for all storm drainage facilities within the boundaries of the subdivision:

a. Open drains and watercourses-

The extreme width of the drain or watercourse plus 15 feet from top of bank on both sides of the channel.

b. Enclosed drains-

A minimum of twenty (20) feet centered on the centerline of the pipe . However, larger pipe size, certain soil conditions, or depth of pipe may require larger easements.

c. Rear yard drains-

For pipe sizes less than 12 inches in diameter, a minimum of twelve (12) feet centered on the centerline of the pipe.

d. Pump stations, detention/retention basins and other storm drainage facilities-

Sufficient easement area to allow for operation and maintenance of the entire facility, including freeboard area, the banks and any berms at the top of the banks.

Easement widths for legally established County Drains shall be sized by the Oakland County Water Resources Commissioner's office. In general these will conform to the above referenced requirements. Additional easements may be required by the Water Resources Commissioner's office should soil, construction conditions or other circumstances so warrant.

Easement information shall be shown on the preliminary plan, final construction plans and final "Mylar" plat.

The wording relative to easement information shown on the final plat shall be as specifically required by the Water Resources Commissioner's office. All County Drain easements shall be labeled as follows: "Permanent private easement for the NAME County Drain".

The Oakland County Water Resources Commissioner's office reserves the right to modify easement requirements at its discretion.

## **B. Construction Plans**

The Proprietor will submit final construction plans that have been prepared under the direction of, and sealed by, a Registered Professional Engineer with a completed application form. The Water Resources Commissioner's Office will review the plans for adequacy of storm water management design to ensure that the proposed storm water drainage system has the capacity to handle all contributing flow without diminution of the existing off-site natural drainage patterns.

Two complete sets of final construction plans shall be submitted. The plans must be drawn to a scale not smaller than 1"= 50' on sheets no larger than 24" x 36" and designed in accordance with the design criteria presented herein.

### 1. *Required Information*

The plans should include, at minimum, the following:

- a. A cover sheet which includes a site legal description and location map with north arrow and the number of acres proposed to be platted. For phased developments, indicate clearly the phase limits and the number of acres in each phase.
- b. Subdivision layout of lots, roads and all existing and proposed easements.

- c. Plans, profiles and details of all roads.
- d. Plans, profiles and details of all enclosed storm drains, open ditch drains, drainage swales and drainage structures.
- e. Plans and details of the soil erosion and sedimentation control measures. Indicate which measures are temporary or permanent and the party responsible for maintaining the control measures.
- f. Plans, cross-section views and details of the detention or retention basins and the outlet. If an existing basin on or off-site will be used then as-built information must be provided.
- g. A drainage breakup sheet indicating the number of acres, calculated to the nearest tenth, contributing to each specific drainage structure.
- h. Topographic map or maps at two foot contour intervals with North American Vertical Datum of 1988 (NAVD 88), or most current national datum, showing existing topography and proposed grades of the entire area to be subdivided, as well as the topography of all adjacent property to the extent that off-site contributing flow can be determined. All off-site contributing flow must be accommodated. This map or maps shall also show all existing watercourses, lakes and swamps.
- i. Design data and criteria used for sizing all drainage structures, channels and detention/ retention basins.
- j. Storm drain hydraulic, detention/ retention and runoff coefficient calculations as well as design calculations for all drainage swales and overflow structures. Overflow structures must be sized to pass all contributing off-site flow.
- k. Specifications governing construction, i.e. material specifications, pipe bedding, construction notes, compaction requirements, etc.
- l. A plan and a proposed schedule for the perpetual maintenance of the complete storm drainage system. Indicate who will be responsible (i.e. municipality or homeowners' association) for the maintenance. If the homeowners' association will be responsible for the system, the subdivision deed restrictions must have a section indicating such responsibility and a copy must be submitted to the Water Resources Commissioner. If there is a maintenance agreement with the City, Village or Township, a copy of the agreement must be submitted to the Water Resources Commissioner. The maintenance plan must be submitted prior to plan approval.

## 2. *Review Time*

The Water Resources Commissioner's office will attempt to review these plans in the shortest possible time. A preliminary plan must be submitted and approved prior to submitting the final construction plans, so that no time is wasted on a drainage design that would be unacceptable. The construction plan approval is valid for one (1) year. The one-year period may be extended if applied for by the proprietor and approved by the Water Resources Commissioner in writing.

## 3. *Changes To The Plans*

Approval of the final construction plans is intended to be final approval, and the actual signing of the "Mylar" plat is only a formality, as long as there are no changes in the final construction plans from what was approved. If either the Proprietor or the Commissioner find it advantageous to make changes before the "Mylar" plat is presented to the Commissioner for signature, such changes can be made, provided that the same procedures outlined above are repeated with each change in the layout. The Proprietor is reminded that approval of the proposed subdivision by the local governing body is also required under the Plat Act. Such changes shall be incorporated in the layout and revised construction plans shall be resubmitted even though the original layout may have already been approved by the Commissioner. If the Proprietor does not present his "Mylar" plat to the Commissioner for approval within a period of one year after receiving approval of the final construction plans, it may be necessary that he resubmit the layout for review in the light of new information which may have become available during the interim.

## **C. Final Plat**

The Proprietor shall submit the final "Mylar" plat to the Water Resources Commissioner for certification. The plat will be reviewed for accurate drainage easements and equivalence with the approved construction plans. If the Commissioner approves the plat, he will affix his signature to it and the plat will be executed. If the Commissioner rejects the plat, written notice of such rejection and the reasons therefore are given to the Proprietor within ten days.

Prior to the Proprietor submitting the final "Mylar" plat for certification, the following is required:

- ✓ Approval of the preliminary plat.
- ✓ Approval of the final construction plans.
- ✓ Assurance of adequate maintenance and inspection of the installation of both the external and internal storm drainage facilities.
- ✓ A soil erosion and sedimentation control permit under Part 91 of Act 451 of the Public Acts of 1994 as amended.
- ✓ Payment by the Proprietor of the plat review fee, according to the latest schedule posted on the Oakland County Water Resources Commissioner's website [www.co.oakland.mi.us/drain](http://www.co.oakland.mi.us/drain) .
- ✓ A minimum, non-refundable application fee is required upon submittal of the preliminary plat and the construction plans.

## **III. MOBILE HOME DEVELOPMENTS**

Public Act 96 of 1987, The Mobile Home Commission Act, requires a developer of a Mobile Home Park to submit a preliminary plan to the Water Resources Commissioner.

### **A. Preliminary Plan**

The preliminary plan shall include the location, layout, general design and a general description of the project. The preliminary plan does not include detailed construction plans.

### **B. Outlet Drainage**

The Water Resources Commissioner must review and may approve the outlet drainage for the park. The design standards covered in Section II of Design Criteria and Engineering Methods will be used for this review. All pertinent design calculations must be submitted. The interior drainage within the park will not be reviewed unless the park storm drain system is to be established as a County Drain under Chapter 18 of the Drain Code.

The Water Resources Commissioner may approve or reject preliminary plans within 60 days of their receipt, otherwise the plan is considered approved.

Mobile home park construction plans are reviewed by the Mobile Home Commission.

## **IV. DRAINS UNDER THE JURISDICTION OF THE WATER RESOURCES COMMISSIONER**

### **A. Permits**

A permit shall be required from the Water Resources Commissioner prior to performing any work to a County Drain or its appurtenances. The following are examples of work:

- a. Connecting to any part of an open ditch, enclosed drain or manhole or drainage structure. A tap can be a direct connection or a pipe outlet.
- b. Crossing any part of an open ditch or enclosed pipe. Examples of crossings are utility lines, driveways, culverts and bridges. A minimum clearance of five (5) feet for an open ditch drain and eighteen (18) inches for an enclosed drain must be maintained between the drain and any proposed utility or other underground crossings of the drain.
- c. Relocating any part of a County Drain.
- d. Enclosing any portion of an existing open ditch drain.
- e. Performing work within a County Drain easement.
- f. When the installation of a fence, driveway, patio, pool or other structure that does not have a foundation, encroaches into the County Drain easement.

The following requirements of the permit must be met:

- Construction plans must be submitted to this office for review. The plans shall include design calculations for storm water storage volume and allowable outflow. A drainage area map must be included with the plans.
- The review application and application fee, appropriate permit fee and inspection deposit must be submitted before a permit is issued. Permit fees are determined on a site-specific basis.
- A notice of 48 hours must be given to the Oakland County Water Resources Commissioner's Inspection Department prior to any construction affecting the drain. In the event that our Inspection Department is not notified as stipulated herein the entire inspection deposit will be forfeited.
- Flow shall be maintained in the drain at all times during construction.
- All work must be completed in accordance with the plans and specifications submitted by the Owner/Developer and approved by this office.
- Work performed on the County Drain or its appurtenances must be performed in accordance with the Oakland County Water Resources Commissioner's Storm Drain Notes and Details Sheet.
- A drain permit issued by the Water Resources Commissioner's Office will not relieve the applicant and/or his contractor of the responsibility of obtaining permits, approvals or clearances as may be required from federal, state or local authorities, the public utilities and private property owners.
- An as-built plan of the drain involvement must be submitted.
- The Water Resources Commissioner shall be notified in writing within ten days of the completion of a project. A final inspection will be performed and a letter of permit closure may be issued.
- A letter of permit closure must be issued by the Water Resources Commissioner before any remaining deposit money is refunded.

- A permit shall expire when work has not commenced within one year of the date of issuance. The Water Resources Commissioner may extend the permit for a period of time upon the request of the Owner/Developer in writing.
- The Water Resources Commissioner may revoke a permit if there is a violation of the conditions of the permit or if there is a misrepresentation or failure to disclose relevant facts in the application.

☞ A drain permit is separate from a Soil Erosion Control permit.

## **B. Construction Plans**

Any development that will outlet storm water directly to a County Drain will be reviewed by the Water Resources Commissioner for adequate storm water storage volume and outlet drainage. The standards covered in the Design Criteria and Engineering Methods section will be used for this review. All other involvements will have a drainage review performed relevant to the work proposed.

The Proprietor shall submit three (3) sets of construction plans with a transmittal requesting plan review. The plans must be prepared in accordance with the design standards presented herein and sealed by a Registered Professional Engineer or Land Surveyor. All pertinent design calculations must be submitted with the final construction plans. Preliminary plans may be submitted, but are not required.

Certain County Drains have limited capacity. The allowable discharge to these drains will be dictated by the Water Resources Commissioner and may be more stringent than these design requirements.

## **C. Drainage Districts and Easements**

County Drain Drainage District limits must be adhered to when designing the site. Drainage Districts do not necessarily conform to existing topography. If drainage originating outside of a certain district is discharged within the district, a drainage district enlargement will be required. Contact the Water Resources Commissioner's office regarding this process.

Drains constructed prior to 1956 may not have a recorded easement, however the easement exists in the permanent records at the Water Resources Commissioner's office. At that time easements for drainage purposes were not required to be recorded with the County Clerk; it was legally sufficient to have them on file at the drain office. Therefore, it may be necessary to record a new County Drain easement, depending upon the work that is proposed and the County Drain involved. If a new easement is required, contact the Water Resources Commissioner's Office regarding this process.

## **V. CHAPTER 18 DRAINS**

Chapter 18 drains are new developments within Oakland County where the local municipality has passed an ordinance that requires all residential and certain commercial drainage systems to be established as County Drains in accordance with the provisions of Section 433, Chapter 18 of the Public Acts of 1956, as amended, the Michigan Drain Code. At present, Oakland and West Bloomfield Townships each have such an ordinance.

### **A. Construction Plans**

Plan submittal must be in accordance with the regulations of the municipality where the development is located. It is the responsibility of the Developer to contact the municipality and ascertain whether plans should be submitted directly to WRC or to the Municipality first.

When submitting plans directly to WRC, the Developer must submit three (3) complete sets of construction plans prepared according to the same specifications as a platted subdivision along with a letter from the Developer requesting that the storm drainage facilities be established as a County Drain. In the case where the Chapter 18 Drain development will be platted, the procedures for a preliminary and final plat must also be adhered to.

Final construction plan approval will not be granted until all required documents and fees have been received. Construction of the storm drain system may not begin until the construction plans have been approved. This office will provide full time construction inspection of the storm drain system. Drainage facilities constructed without appropriate inspection by this office or its designated representative may not be accepted by this office as a County Drain.

After the construction plans have been approved, this office will process the final subdivision plat as set forth in the Subdivision Control Act of 1967, as amended.

## **B. Required Documents and Information**

- A letter from the Developer requesting that the storm drainage facilities be established as a County Drain.
- A certificate from the design engineer certifying the adequacy of the storm drainage outlet. The Developer's Engineer must certify that the outlet for the proposed drain is adequate and will not cause detriment or diminution of the drainage service presently provided. An Engineer's Certificate must be sealed.
- A copy of the Title Policy or other proof of land ownership.
- A metes and bounds property description with proof of survey closure.
- Sidwell number(s) of all property proposed to be included in the drainage district.
- An estimate of the construction cost of the drainage facilities.
- The Developer and/or Landowner of Record must enter into an Agreement to establish the new County Drain or Branch Drain of an existing Chapter 18 County Drain. The Agreement will be prepared by the Water Resources Commissioner.
- Company name and address and name and professional title of individuals who will execute the Agreement.
- Payment of fees and contingency deposit. The Developer must pay administrative, inspection and maintenance fund fees and deposit a construction contingency amount.
- A copy of the recorded deed restrictions which includes the appropriate County Drain easement language.

## **C. Final Acceptance**

Following construction, submittal of all required documents and final as-built mylars of the storm drain system, the drain may be conditionally accepted for operation and maintenance if the site is substantially vegetated and stabilized.

One year after conditional acceptance of the Drain the Developer may request, in writing, a refund of the contingency deposit. Our Maintenance Unit will perform a final walk through inspection of the Drain and the project file will be reviewed by this office. If all requirements have been met, then a final accounting will be made and a letter of final acceptance will be issued along with any remaining refundable amounts of the contingency deposit.

Chapter 18 Drain requirements are explained in further detail in Section IV of "Design Criteria and Engineering Standards".

# DESIGN CRITERIA AND ENGINEERING STANDARDS

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## I. SITE DRAINAGE

The standards and design criteria set forth herein are intended to guide designers to develop a storm water management system that controls the quantity and quality of storm water discharge from a site. The internal drainage for a site as well as the downstream conditions will be reviewed. Every site is part of an overall watershed and the system should be designed with this in mind. The system should conform to natural drainage patterns both on and off-site. These standards are the minimum requirements of the Oakland County Water Resources Commissioner and should not be construed as all-inclusive. The design engineer should consider many factors when planning the storm water management system. In particular, Federal, State and Local standards may be more strict than these standards. In the case where conflicting standards arise, the more stringent requirements will govern. Exceptions will be considered when conforming to a local community master plan or storm water management plan is required.

### A. General Information

The County Water Resources Commissioner has been given the responsibility of determining the adequacy of the proposed storm drainage, and therefore the engineering unit will review the final construction plans for conformance with the following general drainage standards.

- An adequate outlet for the storm water must be demonstrated. The designer must show that the outlet has the capacity to handle the discharge from the site. *In no case will the discharge be allowed to exceed the site's pro-rata share of the capacity of the outlet.* There shall be no diminution of the drainage service presently provided by the outlet for the area that it serves. The site's pro-rata equitable share of the outlet capacity should be calculated and shown on the construction plans.
- There may be cases where the existing outlet has limitations due to downstream conditions. In this situation the discharge from the site will be restricted to conform to the governing downstream conditions.
- There may also be cases where the outlet has already reached capacity. The burden is on the proprietor to design and construct, at his expense, any necessary improvements to the downstream outlet. Such designs will be reviewed by the Water Resources Commissioner's office for adequacy. Additional controls may be required in these cases in order to protect downstream properties.
- The discharge from a site should outlet within the watershed, drainage sub-basin or county drain drainage district where it originated. The drainage should not be diverted to another sub-basin.
- Storm water detention or retention shall be provided. The detention basin shall be designed for a 100-year storm event and include a sediment fore bay or manufactured storm water treatment system.

### B. Lot Grading

The Water Resources Commissioner will review the grading plan for sites that will be platted under Act 288 and a subdivision or site included in the Chapter 18 Drain program. Positive drainage is required. Final lot grading inspection is under the jurisdiction of the local municipality. The minimum requirements are as follows:

- The grading of the lot shall be such that surface runoff is directed away from homes and towards swales, ditches or drainage structures. Provision for drainage either by filling and grading or by providing some type of outlet shall be made for all areas within the proposed subdivision.
- A proposed finished floor grade and proposed lot grading must be shown for each home or structure. A minimum of ½ foot of fall is required away from the home and between lots. Proposed grades may be indicated with spot grades or contours. A distinction between existing and proposed should be evident.

- Where a walkout or daylight basement is proposed, sufficient grades should be shown at the location of the walkout to indicate positive drainage away from the walkout. Additional spot grades at the house corners and rear yard should be shown.
- Where finished grades indicate a substantial amount of drainage across adjoining lots, a drainage swale of sufficient width, depth and slope shall be provided on the lot line to intercept this drainage.
- Sufficient off-site topography must be shown to determine the extent of contributing runoff. Provisions must be made to accommodate the off-site contributing flow.
- Lots that lie within a flood plain shall satisfy the Michigan Department of Environmental Quality and FEMA requirements for subdivisions within a flood plain. In no case will the filling of a lot be permitted if the flood plain is so restricted as to cause possible flooding or back up of the stream.

Examples of correct lot grading are included in Appendix 1.

## C. Determination of Surface Runoff

### 1. Rational Method

For small areas, such as sizing swales, channels and culverts, the “Rational Method” will be used to determine surface runoff. Because the “Rational Method” assumes a uniform rainfall intensity, it is best suited for small areas. The “Rational Method” is defined as follows:

$$Q = C \times I \times A$$

Where,

- $Q$  = peak runoff (cfs)
- $C$  = runoff coefficient, a composite for the drainage area shall be used
- $I$  = average rainfall intensity (inches/ hour)  
100-yr storm will be used and  $I = 275 / (T_c + 25)$
- $T_c$  = Time of Concentration, in minutes
- $A$  = drainage area in acres

Larger sites should use a more appropriate method of determining flow. For watersheds up to 20 square miles, the suggested method for determining surface runoff is the Soil Conservation Service (SCS) Methodology. The computations should be based on the Type II rainfall distribution, 100-year, 24-hr storm. It is the responsibility of the design engineer to determine the best method to use for the site.

### 2. Coefficient of Runoff

A realistic coefficient of runoff will be used based upon the imperviousness of the contributing acreage. The range of this coefficient may vary from 0.15 for completely grassed areas to 0.90 for impervious areas and 1.0 for open water. The runoff coefficient calculation must be included with plan submittal.

Certain calculations require a composite runoff coefficient value. A composite runoff coefficient is calculated as follows:

$$\bar{C} = \frac{\sum_{i=1}^n (A_i \times C_i)}{\sum_{i=1}^n A_i}$$

Where,  $C_i =$  runoff coefficient for each sub-area  
 $n =$  total number of sub-areas  
 $A_i =$  drainage area in acres for each sub-area

### 3. *Time of Concentration*

An initial time of concentration of 20 minutes will be used on residential subdivisions. The time of concentration must be calculated for commercial and industrial subdivisions.

The design engineer may also use a calculated time of concentration if desired. The methodology and computations must be submitted for review. The time of concentration for unimproved, pre-development lands will be checked using the following formulas:

Small tributary- 
$$T_c (\text{min}) = \frac{L'}{2.1 * \sqrt{S_o * 60}}$$

Waterway- 
$$T_c (\text{min}) = \frac{L'}{1.2 * \sqrt{S_o * 60}}$$

Sheet Flow- 
$$T_c (\text{min}) = \frac{L'}{.48 * \sqrt{S_o * 60}}$$

Where,  $L' =$  flow length, in feet  
 $S_o =$  slope, in %

When more than one type of flow exists, the individual flows should be summed up to find the total time of concentration.

These equations were taken from: Richard C. Sorrell, SCS Methodology, Michigan Department of Natural Resources, May, 1977

### 4. *Allowable Discharge Rate*

The allowable discharge rate from a site shall be restricted to agricultural runoff, which is defined by this office as a maximum of 0.20 cfs per acre.

There may be cases where the existing outlet has limitations due to downstream conditions. In this situation the discharge from the site will be restricted to conform to the governing downstream conditions. For example, if there is an existing culvert downstream, then the allowable outflow from the proposed site will be limited to the pro-rata share of the capacity of the culvert. The site's pro-rata equitable share of the outlet capacity should be calculated and shown on the construction plans.

Certain established Oakland County Drains have limited capacity and the allowable discharge will be less than agricultural rate.

## II. **Storm Water Storage Facilities**

On-site storage of storm water runoff is required for all sites. Cases where the outlet or community master plan allows for undetained storm water discharge will be evaluated on an individual basis.

## **A. Determining Storm Water Storage Volume Required**

### *1. Detention Basin*

#### a. General Requirements

Following are the minimum requirements for a detention facility:

- A sediment fore bay, or equivalent structure, designed to capture the runoff from a 1 year storm is required for all sites. The fore bay should be a separate cell from the main detention basin and designed such that it will dewater within 48 hours. The volume of detention within the fore bay, above any proposed permanent pool of water, can be considered when calculating total detention volume required for a site.
- A manufactured storm water treatment system may be used in lieu of a sediment fore bay.
- The volume of detention provided must be equal to or in excess of that required by the Oakland County Water Resources Commissioner's "A Simple Method Of Retention Basin Design" for a 100-year frequency storm, included in Appendix 4.
- Detention volume must be provided for all on-site acreage contributing to the detention basin. All offsite tributary acreage must be accommodated by sizing the basin overflow structure to pass the off-site flow.
- Detention volume on a gravity outflow detention basin is defined by this office as the volume of detention provided above the invert of the outflow pipe. Any volume provided below the invert of the outflow pipe is considered a permanent pool of water and will not be considered as detention volume.
- All detention basins must have a positive method by which to be de-watered. Use of a pumped outlet is discouraged. If a permanent pool of water is proposed, the basin must completely de-water to the elevation of the permanent pool.
- The velocity of storm water entering the storage facility should be a non-erosive velocity. This velocity is generally between 2.5 fps and 5 fps.
- Detention basin side slopes may not exceed 1foot vertical to 6 feet horizontal for a wet basin and 1 foot vertical to 4 feet horizontal for a dry basin unless fencing is provided. Requirements regarding fencing will be evaluated on a case by case basis.
- The basin shape should be such that flow entering the basin is evenly distributed and no stagnant zones can develop. An irregularly shaped basin is best. The inlet and the outlet should be at opposite ends with the maximum distance possible between them. For dry basins, use of swales or berms on the bottom of the basin to maximize travel distance during periods of low flow are encouraged.
- When there is no permanent pool of water, the bottom of all detention basins shall be graded in such a manner as to provide positive flow to the pump or pipe outlet.
- All detention basins must have an internal overflow.
- One foot of freeboard shall be provided above the 100-year storm water elevation.
- Fencing will be required as needed, depending upon basin depth, steepness of side slopes, depth of permanent pool, etc. Requirements regarding fencing will be evaluated on a case by case basis.
- All detention basins must be permanently stabilized to prevent erosion.
- Detention basins constructed by building up on existing grade must have berms with a clay core keyed into native ground.

Provisions for maintenance of the detention basin shall be made by the developer with the subdivision association or the local municipality. Evidence of such provisions must be submitted. This office will not accept the responsibility for the maintenance of any detention basin unless it is being constructed as a Chapter 18 County Drain.

b. Design Procedure

When calculating the volume of an irregularly shaped basin or lake, the Oakland County Water Resources Commissioner will use the formula for calculating the volume of a frustum of a circular cone. This formula is:

$$V = \frac{H}{3} (A_1 + A_2 + \sqrt{A_1 \times A_2})$$

Where:

- $V$  = volume
- $H$  = difference in depth between two successive depth contours
- $A_1$  = area of the basin within the outer depth contour being considered
- $A_2$  = area of the basin within the inner depth contour line under consideration

The procedure consists of determining the volumes of successive layers of water (frustums), and then summing these volumes to obtain the total volume of the basin.

Taken from: Clarence M. Taube., Chapter 12: Three Methods for Computing the Volume of a Lake, Manual of Fisheries Survey Methods II, Michigan Department of Natural Resources, 2000

An example calculation is included in Appendix 2. The following procedure will be used to review detention basin volume calculations:

- 1) Using the Oakland County Water Resources Commissioner's "A Simple Method Of Retention Basin Design" for a 100-year frequency storm, calculate the total volume of storage required for the entire site. This is the volume required ( $V_t$ ).
- 2) Using the formula for computing the volume of an irregularly shaped basin, calculate the total volume of the proposed detention basin by summing the volumes of successive contour elevations. This is the actual volume provided ( $V_{prov}$ ). The volume provided must be equal to or greater than the total volume required.
- 3) Calculate the actual discharge rate from the basin at each of the successive elevations used to compute the volume provided. This is the actual flow rate out of the basin ( $Q_{act}$ ) at each elevation.
- 4) Using the calculated discharge rates ( $Q_{act}$ ) calculate the volume required ( $V_{req}$ ) at each of the elevations used to compute a volume provided. The elevation at which the required volume and provided volume are approximately equal will be the 100-year storage level in the detention basin. The actual flow rate out of the basin at the 100-year storage level must be equal to or less than the allowable outflow ( $Q_{allowable}$ ) for the basin.

2. *Retention Basin*

A "no-outlet" retention basin is only permissible subject to certain conditions that include, but are not limited to, the following:

- There is no other available positive outlet for the storm water runoff from the property. Every effort should be made to provide a means to de-water the basin, including a pump outlet and possible downstream improvements.
- The permeability of the existing soils must be demonstrated such that percolation of the retained storm water is possible. Soil boring logs must be submitted for review. The borings must be taken within the proposed basin bottom area to a distance of 20 feet below the proposed basin bottom elevation. Calculations performed by a professional geotechnical engineer must be submitted. The calculations must indicate the percolation rates for the soils encountered during soil boring.

- An infiltration trench is not considered an acceptable substitution for permeable soils.

The proposed storage volume of the retention basin is calculated on the basis of total contributing acreage, including all offsite areas that flow onto the property. Sufficient storage capacity must be provided for two consecutive 100-year storm events, which WRC defines by the following formula:

$$V = 2 \times 16,500 \times A \times C$$

Where,  $V$  = volume Required (ft.<sup>3</sup>)  
 $A$  = contributing acreage  
 $C$  = composite runoff coefficient

- The retention storage is calculated as volume provided in the basin above the existing ground water elevation.
- The side slopes of the proposed retention basin can be no steeper than one foot vertical to six foot horizontal.
- An overflow facility from the retention basin must be provided. Elevations of surrounding buildings, development or other features that would be impacted by a basin overflow must be indicated. If an overflow structure cannot be constructed a defined overflow route must be indicated. The overflow route may not endanger any existing structures or features. Downstream drainage easements may be required for the overflow route.
- One foot of freeboard must be provided above the proposed storage elevation.

### 3. *Sediment Forebay*

All detention and retention basins shall have a sediment forebay. A forebay must be installed at all incoming discharge points to the basin. The purpose of the forebay is to capture sediment in one area and prevent sediment buildup in the main basin. The forebay shall be a separate basin, which can be formed within the main basin by creating a separation with an earthen berm, riprap berm or rock or concrete retaining wall. A manufactured storm water treatment system can be used in lieu of a sediment forebay.

- The sediment forebay shall be sized to accommodate a one-year storm event. This office will use the "Detention Time" method of design from the WRC Erosion Control Manual to check the forebay design calculations. An example calculation is included in Appendix 2.
- The forebay may be included as part of the total required basin volume, above any permanent pool of water. The forebay cannot be included as available storage if it remains full of water.
- The side slopes cannot exceed 1 foot vertical to 4 feet horizontal.
- The forebay should have a sump a minimum of 2 feet deep to capture sediment and prevent resuspension of sediment. The bottom of the basin should slope toward the sump area to capture the sediment.
- The outlet shall be designed to capture the one-year storm event and dewater the basin within 48 hours. An outlet structure with restricted discharge may also be used within the separation.
- An outlet (overflow) spillway should be constructed on the separation which allows water to exit the forebay at non-erosive velocities.
- An access road should be provided for forebay maintenance. An access road is required for all facilities that will be established as a Chapter 18 County Drain.

- The forebay should also have a fixed sediment depth marker to measure the amount of sediment that has accumulated. The sediment should be removed when half of the sediment storage capacity has filled in.

#### 4. *Manufactured Storm Water Treatment Systems*

Manufactured treatment systems may be used in lieu of a sediment forebay. These devices are used to remove sediment and other particulate matter from storm water runoff. The following are requirements for manufactured treatment systems:

- Manufactured treatment systems must be installed upstream of the storm water detention system. If the site is not required to provide storm water detention, a manufactured treatment system must be installed upstream of the connection to a county drain.
- The storm drain system shall be designed with an external bypass at the manufactured treatment system location to allow continuance of flow in the event the manufactured treatment system becomes obstructed.
- The system shall conform to the standards set forth by the New Jersey Department of Environmental Protection (NJDEP) for manufactured treatment systems, as defined at <http://www.njstormwater.org/treatment.html>, including inline and/or offline use, manhole diameter size, and custom or multiple units.
- Calculations for determining peak discharge (qp) from a particular site shall be based on the Michigan Department of Environmental Quality Stormwater Management Guidebook, Graphical Peak Method (Appendix 5). The following factors shall be used for determining the peak discharge (qp) as defined in the said Graphical Peak Method:
  - Frequency shall be a 2-year, 24-hour storm
  - Rainfall, P (24-hour) shall be 2.24 inches
  - Runoff, Ro shall be 0.9 inches

The NJDEP Certified Treatment Flow rate (cfs) for a manufacturer and model shall be higher than the calculated peak discharge (qp) for a particular site.

#### 5. *Underground Detention Facilities*

Generally, underground detention facilities are discouraged because of difficulty in maintaining them. However, underground detention facilities may be allowed on sites where traditional storm water management measures are infeasible, such as sites less than 1 acre in size or renovation of an existing site that originally did not have a basin. Each site will be evaluated on an individual basis.

Complete details, calculations and specifications must be submitted for the facility. The underground facility must comply with all standards imposed on traditional facilities; Including, but not limited to, a restricted outlet, overflow structure and a perpetual maintenance plan.

Underground detention facilities are prohibited in developments where the storm water detention facilities are under the jurisdiction of this office.

#### 6. *Infiltration Trench*

An infiltration trench is not considered a preferred means of discharging storm water. Routing storm water runoff directly to an infiltration trench could contaminate ground water. Storm water must be routed through a facility or structure that filters the storm water prior to discharging to the trench. No outflow credit will be given for detention basins with an infiltration trench that is intended to function as a basin outlet.

#### 7. *Leaching Basin*

A leaching basin is not an effective means of controlling and treating storm water runoff. A leaching basin must be used in conjunction with other drainage facilities.

## 8. *Innovative BMP's*

Non-traditional storm drainage facilities that improve the quality and reduce the quantity of storm water runoff are encouraged as long as the required detention volume and allowable outflow are achieved.

Complete details and specifications for the proposed storm drainage facilities must be submitted. There should be sufficient information provided such that a comprehensive review can be performed. Each case will be evaluated on a site-specific basis.

### **B. Utilizing Wetlands, Waterbodies and Natural Low Areas for Storage**

Prior to approval of any proposed plan to use existing wetlands or waterbodies for detention purposes, permits from the appropriate state and local agencies must be applied for. Proof of such application must be submitted.

Direct discharge of storm water runoff to a wetland or waterbody is not allowed. The runoff must be routed through a facility that is specially designed to remove silt, sediment, trash, oil, grease and other debris and pollutants before discharging.

The minimum design requirements are as follows:

- Calculations must be submitted that indicate the stage rise of the wetland or waterbody due to the runoff. Each site is entitled to their pro-rata share of the capacity of the wetlands.
- A freeboard elevation must be established at one foot above the calculated stage rise.
- The stage rise should be calculated from the ordinary high water elevation.
- There shall not be point discharge of storm water to wetlands. The discharge must be routed through a level spreader or through stones, on the wetland fringe, prior to discharging to the wetlands to avoid erosion.
- A natural buffer strip is recommended around the perimeter. A drainage easement that encompasses the entire area on site, including freeboard and buffer strip, will be required. In addition, off site easements may be necessary.
- The character of the wetlands must not be altered by the addition of the storm water. A control structure must be constructed at the outflow of the wetland area to release storm water at a restricted rate as determined in Section 1. The wetland must return to it's normal water level within 24 to 48 hours.

☞ In no case will retention of storm water within a wetland area be allowed.

- Storm water runoff directed to natural low areas will be considered the same as retention. The area must have the capacity to hold two consecutive 100-yr storm events and have a designated overflow route. Each site is entitled to their pro-rata share of the capacity of the depression for the land area tributary to it. A drainage easement that includes the entire area up to the freeboard elevation will be required.

### **C. Detention Basin Outlet Design and Overflow Structure Design**

If an adequate outlet for the site's storm water has been demonstrated, the allowable outflow from a detention basin is a maximum 0.20 cfs per acre. The allowable discharge calculations must be submitted.

☞ There may be cases where the existing outlet has limitations due to downstream conditions. In this situation the discharge from the site will be restricted to conform to the governing downstream conditions. For example, if there is an existing culvert downstream, then the allowable outflow from the proposed site will be limited to the pro-rata share of the capacity of the culvert. The site's pro-rata equitable share of the outlet capacity should be calculated and shown on the construction plans.

☞ There may also be cases where the outlet has already reached capacity. The burden is on the proprietor to design and construct, at his expense, any necessary improvements to the downstream outlet. Such designs will be reviewed by the Water Resources Commissioner's office for adequacy.

Additional controls may be required in these cases in order to protect downstream properties.

- The basin outlet must control the runoff from the 100-year storm event. The actual outflow from the basin at the design storm water level may not exceed the allowable outflow.
- The outlet pipe or drainage path must be designed to carry the flow from all on-site and off-site contributing acreage.
- A cut-off collar or anti-seep diaphragm may be required to be installed around the outlet pipe within the bank of the basin, depending on the depth of storage in the basin.

The standard orifice equation will be used to check restrictor sizing calculations:

$$Q = C \times A \sqrt{2gh}$$

Where,  $Q$  = allowable outflow (cfs)  
 $C$  = orifice coefficient  
 $A$  = orifice area (ft<sup>2</sup>)  
 $g$  = gravity constant, 32.2 ft/s<sup>2</sup>  
 $h$  = total head on orifice measured from the design water level (feet)

- The minimum restrictor size is 3" diameter. If a 3" diameter restrictor permits discharge in excess of the allowable outflow then a different restricted outlet design may be required, such as a weir. For storm drain systems being established as Chapter 18 Drains, the restrictive orifice outlet must be grouted inside a minimum 12" diameter pipe with an end section, at the upstream end of the pipe. The restrictor must be sized for the on-site flow that is tributary to the basin. The basin overflow structure shall be sized to pass the on-site flow and the off-site tributary flow.

The following equations will be used to check weir design:

Sharp-Crested Weir-

$$Q = C \times L \times h^{3/2}$$

Where,  $Q$  = Discharge over the weir (cfs)  
 $C$  = Discharge coefficient, 3.33  
 $L$  = Length of weir crest (ft)  
 $h$  = Head above the weir crest (ft)

Triangular Sharp-Crested Weir-

$$Q = C \times h^{5/2}$$

Where,  $Q$  = Discharge over the weir (cfs)  
 $C$  = Discharge coefficient for a 90° triangular weir, 2.5  
 $h$  = Head above the weir notch bottom (ft)

### Broad-Crested Weir-

$$Q = C \times L \times h^{3/2}$$

Where,  $Q$  = Discharge over the weir (cfs)  
 $C$  = Discharge coefficient, 3.0  
 $L$  = Length of weir crest (ft)  
 $h$  = Head above the weir crest (ft)

### Trapezoidal Weir-

$$Q = C \times L \times h^{3/2}$$

Where,  $Q$  = Discharge over the weir (cfs)  
 $C$  = Discharge coefficient, 3.367  
 $L$  = Length of weir crest (ft)  
 $h$  = Head above the weir crest (ft)

Equations taken from: Michael R. Lindeburg, P.E., Civil Engineering Reference Manual, Professional Publications, Inc., CA, 1999

- All detention basins must have an internal overflow structure located at the design water level. This is a structure that will discharge the storm water by by-passing the restrictor in emergency situations. The overflow must have the capacity to pass the on-site flow as well as the off-site tributary flow and have a bar screen or trash hood.

Examples of basin outlet and overflow calculations are included in Appendix 2.

### III. STORM WATER CONVEYANCE

Storm water drainage systems may consist of open ditch drains, swales, closed conduits or a combination of methods to convey storm water. Drainage facilities shall be constructed in accordance with these WRC minimum specifications. Other standards such as: Michigan Department of Transportation, Road Commission for Oakland County, City or Township, which may be more stringent shall also be adhered to. WRC construction standards for enclosed storm drains are available from the WRC office.

#### A. Enclosed Storm Drains

An enclosed storm drain system must be designed to accommodate the storm water runoff from a 10-year storm from the entire contributing watershed. The "Manning" formula will be used to check the pipe size:

$$Q = \frac{1.486}{n} \times A \times R^{\frac{2}{3}} \times S^{\frac{1}{2}}$$

where,

- $Q$  = flow capacity (cfs)
- $n$  = Manning coefficient of roughness
- $A$  = cross-sectional area of pipe (ft<sup>2</sup>)
- $R$  = hydraulic radius of pipe, A/P (ft)
- $P$  = wetted perimeter of pipe (ft)
- $S$  = pipe slope (ft/ft)

The following values will be used for "n":

<i>pipe material</i>	<i>n</i>
smooth concrete pipe, approved flexible pipe	0.013
<b>unlined cmp</b>	<b>0.025</b>

- The hydraulic grade line must be calculated for the entire system. The hydraulic grade will be assumed to start at the elevation of 0.80 x pipe diameter of the outlet pipe or the permanent pool elevation, whichever is higher. The hydraulic gradient should be kept below the top of the pipe; in no case shall it be higher than the rim elevation of any structure.
- The minimum pipe size for storm drains accepting surface runoff is 12" diameter. Rear yard pipes may be smaller, but must be used in conjunction with a drainage swale that directs runoff to a minimum 12" diameter pipe structure.
- Pipe joints must prevent excessive infiltration.
- Storm drains shall be designed to have a minimum velocity flowing full of 2.5 ft/sec and a maximum velocity of 10 ft/sec. The velocity at a pipe outfall should be between 2.5 to 5 ft/sec to prevent scouring at the outlet.
- Riprap shall be installed at all outlets according to the Oakland County Water Resources Commissioner's Storm Drain Notes and Details Sheet. Riprap may consist of minimum 8" diameter to 15" diameter fragmented limestone or other suitable rock underlain with geotextile fabric. Cobblestone, broken concrete or grouted riprap is not preferred. Larger diameter outlets may require larger riprap as velocity and flow conditions dictate.
- A bar screen is required for all pipe outlets and inlets 18" diameter and larger.

A sample calculation for enclosed drains is included in Appendix 2.

## B. Drainage Structures

The flows to specific catch basin or inlet covers shall conform to the following:

1. Combination curb and gutter inlet (MDOT Cover K, or equivalent):  
A maximum of 3.1 cfs at 0% grade (sump condition), and then decreasing as grade increases.
2. Gutter inlet (MDOT Cover D, or equivalent):  
A maximum of 3.2 cfs as 0% grade (sump condition), and then decreasing as grade increases.
3. Rear yard or ditch inlet (MDOT Beehive Cover E, or equivalent):  
In general, a maximum of 2.5 cfs at 0% grade (sump condition), and then decreasing as grade increases. However, a smaller or larger maximum inflow may be allowed as is warranted by surrounding finished grading.

See Appendix 3 for MDOT cover specifications. Calculations for grate inlet capacities must be submitted if different inlets are used.

Drainage inlets shall be located as follows:

1. To assure complete positive drainage of all areas of the site.
2. At all low points of streets and rear yards.
3. Such that there is a maximum of 600 feet of drainage from any particular point on the site to a structure.

## C. Open Watercourses

Appropriate permits from agencies such as the Michigan Department of Environmental Quality must be applied for and a copy of such application must be submitted.

The "Rational Method", SCS method or other prior approved method will be used to determine the amount of flow contributing to the watercourse. All watercourses must be sized to accommodate the runoff from a 10-yr storm event. The "Manning" formula will be used to check the capacity of the watercourse. Appropriate values will be used for "n".

### **Examples of Manning "*n*" values for open channels**

<u>surface</u>	<u><i>n</i></u>
maintained grass channel, rear yard swales, earth channel with stones and weeds	0.025
natural channels, somewhat irregular side slopes; fairly even, clean and regular bottom, very little variation in cross-section	0.035
dredge channel, irregular sideslopes and bottom, sides covered with some saplings and brush, slight and gradual variations in cross-section	0.045

- Open channel flow velocities shall be neither siltative nor erosive. In general the minimum acceptable non-siltative velocity will be 2.5 ft/sec. Every effort should be made to reduce the velocity of flow as much as possible at all storm drain outlets. The outlet velocity should be at maximum 2.5 to 5 feet/second.
- Outlets to channels shall be placed at the bottom of the channel with headwalls or flared end sections with erosion protection as required. Natural stabilization shall be provided where necessary to prevent erosion.
- Erosion protection shall be placed at bends, drain inlets and outlets, and other locations as required in all open ditches.
- Back slopes of channels shall be no steeper than 1 foot vertical to 3 feet horizontal, unless fencing is provided. Ditches with steep grades shall be protected by sod, vegetation or other means to prevent scour.
- A minimum of 5-foot clearance shall generally be between open ditch inverts and underground utilities.
- All bridges shall be designed to provide a 2 foot minimum flood stage freeboard to the underside of the bridge. The bridge footings shall be deep enough to be below the frost line and to allow a 3 foot channel deepening and may not be located within the open channel.
- Areas within open drain rights-of-way, which have been cleaned, re-shaped or in any manner disturbed shall be seeded and mulched or vegetated in some manner.
- A manhole sump or catch basin should be provided at the last structure prior to a storm drain outletting to an open drain as a minimum method of erosion protection.

#### **D. Determination of Culvert Size**

All culvert design calculations must be submitted to this office for review. Calculations must be sealed by a Professional Engineer and must include:

1. Delineation on a topographic map of the area contributing to the culvert.
  2. Hydrologic calculations to determine the amount of flow.
  3. Hydraulic calculations used to determine the size of the culvert.
  4. Calculations for height of cover, gage size and expected loads.
  5. When an existing culvert is proposed to be modified, backwater calculations and/ or downstream calculations may also be submitted.
- This office will use the "Rational Method", the SCS Method or other prior approved method to determine the flow contributing to the culvert. Culverts shall be sized to pass a minimum 10-year storm event or the governing design storm of the watercourse, which may be higher.
  - The velocity within the culvert shall be neither siltative nor erosive.
  - The "Manning" formula or inlet headwater control or outlet tailwater control nomographs will be used to check the culvert design.

Construction requirements and end section treatments are as stated on the Oakland County Water Resources Commissioner's Storm Drain Notes and Details Sheet.

#### **E. Easements**

Easement provisions shall conform to the widths indicated in the "Preliminary Plat" section (Part 3, "Easement Requirements").

All drainage easements, including freeboard and buffer strip, shall be so designated on the plans as well as on the "Mylar" plat.

All existing easements are to be shown and identified on the mylar including the Liber and Page.

Existing County Drain easements shall be indicated on the plans as well as the "mylar" plat and shall be designated as 'XX feet wide easement for the "Name" (County) Drain as recorded in Liber \_\_\_ Page \_\_\_'.

In cases where storm water is discharged to a drain or watercourse on adjoining private property, an improvement to the drain and an agreement with the property owner may be necessary. An off-site drainage easement will be required if:

- a. The watercourse is not depicted as a blue line on a USGS map.
- b. It is not indicated on the MIRIS map.
- c. The watercourse is not considered wetlands by the governing municipality.

## **F. Drains Under The Jurisdiction Of The Water Resources Commissioner**

When a County Drain is the proposed outlet for a site's storm drainage system, the standards outlined herein regarding storm water storage volume and allowable outflow must be complied with. There may be cases where the existing outlet has limitations due to downstream conditions. In this situation the discharge from the site will be restricted to conform to the governing downstream conditions. The allowable outflow from the proposed site will be limited to the pro-rata share of the capacity of the drain. The site's pro-rata equitable share of the outlet capacity should be calculated and shown on the construction plans.

There may also be cases where the outlet has already reached capacity. The burden is on the proprietor to design and construct, at his expense, any necessary improvements to the downstream outlet. Such designs will be reviewed by the Water Resources Commissioner's office for adequacy.

Locations, easements and drainage service area boundaries for County Drains are available from the Water Resources Commissioner's Office. Permanent structures may not be constructed within the easement of a County Drain. This includes storm water storage facilities. All basins must be located entirely outside of the permanent easement.

### *1. Easements*

Prior to 1956, County Drain easements were not required by statute to be recorded with the County Clerk; it was legally sufficient to have them on file at the drain office. Therefore, it is necessary to check the permanent records of the Water Resources Commissioner's Office to see if a drain easement is in existence on the subject property.

It may be necessary to record a new easement for that part of the County Drain that traverses the site. The existing easement may be abandoned in consideration for the granting of the new easement.

For open ditch drains, the easement must be at minimum, wide enough to include the extreme width of the open ditch drain plus 15' on each side measured from the top of bank. In addition, a vegetated buffer strip may be required. For enclosed drains, the easement must be a minimum of twenty (20) feet centered on the centerline of the pipe. However, larger pipe size, certain soil conditions, or depth of pipe may require larger easements.

The proposed easement must be submitted to this office for review. Upon completion of the project the owner's engineer will be required to provide the Oakland County Water Resources Commissioner's Right-of-Way Department with an existing or "as-built" metes and bounds centerline description of the entire length of the drain through the referenced property. Upon submittal of the description, along with proof of property ownership, WRC Right-of-Way Department will prepare the necessary documents for execution by the owner(s).

This office must also be provided with one set of "As-Built" mylars reproduced from the original engineering drawings, cleaned of all background debris, showing plan, profile and the new easement of the drain. A digital version of the "As-Built" plans must also be submitted.

Proposed County Drain easements shall be indicated on the plans as well as the "mylar" plat and shall be designated as 'permanent private easement for the "Name" (County) Drain'. In addition the following note must be added to the mylar:

"Use of the word "private" does not limit in any way the scope of the easement granted to the "Name" (County) Drain Drainage District"

## 2. *Drainage Service Areas (Districts)*

A Drainage Service Area and Special Assessment District are each a legally established boundary for the area served by a County Drain. Drainage Service Areas do not always match the topographical area tributary to a County Drain. Drainage Service Areas shall not be violated when designing a drainage system.

Alterations to a Drainage Service Area and/or a Special Assessment District may be made by following the procedure established in the Drain Code. Approval must be granted by the Water Resources Commissioner or the Drainage Board.

## **G. Soil Erosion and Sediment Control**

Soil erosion and sediment control devices shall be installed as required by the Oakland County Water Resources Commissioner's "Erosion Control Manual" within municipalities where the Soil Erosion and Sedimentation Control Program is administered by the Oakland County Water Resources Commissioner. The following points should be kept in mind when designing an erosion control plan for a site:

- Areas within open drain rights-of-way, which have been cleaned, re-shaped or in any manner disturbed shall be seeded and mulched or otherwise vegetated.
- The smallest practical area of raw land should be exposed at one time during development.
- When raw land is exposed during development, the exposure should be kept to the shortest practical period of time.
- Temporary vegetation and/or mulching should be used to protect critical areas exposed during development.
- The permanent final vegetation and structures should be installed as soon as practicable in the development.
- The development plan should be fitted to the topography and soil so as to create the least erosion potential.
- Wherever feasible, natural vegetation should be retained and protected.

## **IV. CHAPTER 18 DRAINS**

Chapter 18 drains are new developments within Oakland County where the local municipality has passed an ordinance that requires all residential and certain commercial drainage systems to be established as County drains in accordance with the provisions of Section 433, Chapter 18 of the Public Acts of 1956, as amended, the Michigan Drain Code. At present, Oakland and West Bloomfield Townships each have such an ordinance.

Following are the specific requirements of the Oakland County Water Resources Commissioner in accordance with the provisions of the Drain Code.

### **A. Request To Establish a County Drain**

The Developer must submit three (3) complete sets of construction plans prepared and sealed by a Registered Professional Engineer or Professional Surveyor. A letter from the Developer requesting that the storm drainage facilities be established as a County Drain and a certificate from the design engineer

certifying the adequacy of the storm drainage outlet must accompany the construction plans. An Engineer's Certificate must be sealed.

## **B. Agreement to Establish a County Drain**

The Developer and/or Land Owner of Record must enter into an Agreement to establish the proposed drainage system as a County Drain or Branch Drain of an existing legally established County Drain. A district enlargement may be necessary for Branch Drain establishment. The Developer and/or Land Owner must provide this office with the following items for Agreement preparation:

- A copy of the Title Policy or other proof of land ownership
- A metes and bounds property description with proof of closure
- Sidwell number(s) of all property proposed to be included in the drainage district
- An estimate of the construction cost of the drainage facilities
- Company name and address and name and title of individuals who will execute the Agreement.

Once this office has received all of the above information, the Agreement will be prepared. The Agreement must be executed prior to construction plan final approval.

After the Agreement has been signed by all parties and notarized the Water Resources Commissioner will have the Agreement recorded with the County Clerk's Office.

## **C. Construction Plans**

The construction plans must be prepared according to the design standards and specifications presented herein. If the local municipality has more stringent standards then the municipality standards will govern.

In the case where the Chapter 18 Drain development will be platted, the procedures for a preliminary and final plat must also be adhered to.

Final construction plan approval will not be granted until all required documents and fees have been received. Construction of the storm drain system may not begin until the construction plans have been approved. After the construction plans have been approved, this office will process the final subdivision plat as set forth in the Subdivision Control Act of 1967, as amended.

This office will provide full time construction inspection of the storm drain system. Drainage facilities constructed without appropriate inspection by this office or its designated representative may not be accepted by this office as a County Drain.

## **D. Easement Requirements**

The Developer and/or Land Owner shall provide easements for the proposed drainage facilities. Easement requirements vary with the type of site being developed. If the site is a platted subdivision, the easements must be shown on the plat mylar and the standard WRC easement language must be included in the deed restrictions. If the site is a condominium development, the easements must be shown on the "Exhibit B" drawings and the standard WRC easement language must be included in the deed restrictions. A copy of the proposed deed restrictions must be submitted to this office for review. A recorded copy must be on file at this office prior to the final inspection.

Easement widths are to be in accordance with Part F of Section III of these standards.

## **E. Inspections**

This office or its designated representative will perform daily inspection of the construction of the storm drainage facilities. Full time inspection is required for all aspects of storm drain construction. This is to ensure that the storm drainage system is constructed according to the plans and specifications approved by this office.

The Developer and/or Land Owner is responsible for the liability and maintenance of the storm drainage system until it is accepted for service by the Water Resources Commissioner.

The WRC Inspection Department must be notified **2 WORKING DAYS** prior to commencing construction and for all acceptance inspections.

All field changes must be **PRE-APPROVED** by the Oakland County Water Resources Commissioner prior to installation.

1. *First Inspection*

The purpose of the first (Construction) inspection approval is to release the underground contractor from responsibility of damage to the underground drainage system by others during future construction on the project site. The requirements of the first inspection are as follows:

- a. All pipes and structures must be free of dirt and debris.
- b. Structures must be complete, plastered or pointed with channels, benches and castings in place.
- c. All inlets and outlets must be completed with riprap in place.
- d. The storm water storage facility is constructed and stabilized.
- e. The storm drainage system must be completed and fully functional.
- f. All erosion control measures in place and all outstanding soil erosion violation addressed.

2. *Second Inspection*

The second inspection will be performed after the completion of the road paving to insure that the drainage system has not been damaged by the paving process. The purpose of the second inspection is to relieve the Pavement Contractor from responsibility for future damage to the storm drainage system.

3. *Third Inspection*

The purpose of the third inspection is to conditionally accept the drainage system for maintenance and operation by the Oakland County Water Resources Commissioner and to relieve the Developer and/or Land Owner from the responsibility of maintenance of the storm drainage system. The Developer and/or Land Owner is still responsible for the integrity of the system until the completion of the final accounting and final acceptance by the Oakland County Water Resources Commissioner.

The third inspection will consist of a thorough and complete inspection of the entire storm drain system. A punch list of outstanding construction items will be generated and forwarded to the Developer and/or Developer's representative for resolution. Once these punch list items have been addressed and corrected, then a third inspection approval may be issued.

The third inspection can be scheduled after the following requirements have been met:

- a. All disturbed areas must be vegetated. Right-of-ways, easement areas, detention ponds and swales must be sodden or vegetated with an approved plant material.
- b. As-built drawings have been submitted to the Oakland County Water Resources Commissioner.
- c. The local governing body has no objections
- d. There are no outstanding soil erosion issues and no history of poor soil erosion practices by the Developer and/or Land Owner.
- e. All required documents and fees have been submitted and approved, including "Exhibit B" drawings, offsite drainage easements and recorded Deed Restrictions or a Master Deed with the appropriate drain easement language.

## **F. As-built Plans and Mylar Requirements**

Immediately following the completion of construction, the Developer and/or Land Owner shall furnish this office with a set of drawings corrected to indicate as-built conditions. Upon approval of these "As-Built" drawings, the Developer and/or Land Owner shall submit one (1) set of reproducible "Mylar" as-built construction drawings. A digital version of the "As-Built" plans must also be submitted.

## **G. Final Acceptance and Final Accounting**

One year from the date of the third inspection approval (conditional acceptance) the Developer may request, in writing, a final accounting of the project. The project file will be reviewed and a final walk through inspection of the Drain will be performed to ensure that the integrity of the system is intact. The final inspection can be scheduled after the following requirements have been met:

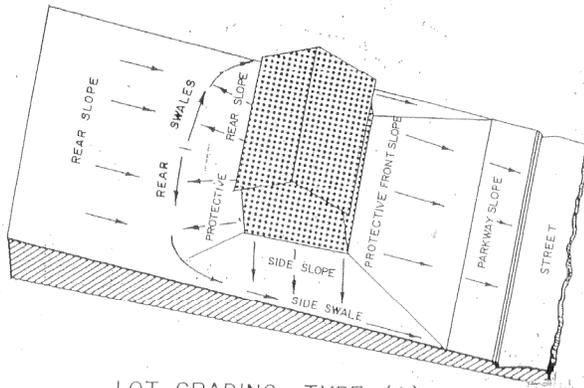
- 1) All conditions of the Agreement are satisfied,
- 2) The drain is functional and serviceable,
- 3) There are no outstanding liens or judgments against the storm drainage system,
- 4) A Developer's Declaration and Developer's affidavit are on file at this office.

If all requirements are met and the final inspection approval has been issued, a final accounting will be made of the project fund. A letter of final acceptance will be issued along with the remaining refundable amount of the deposit.

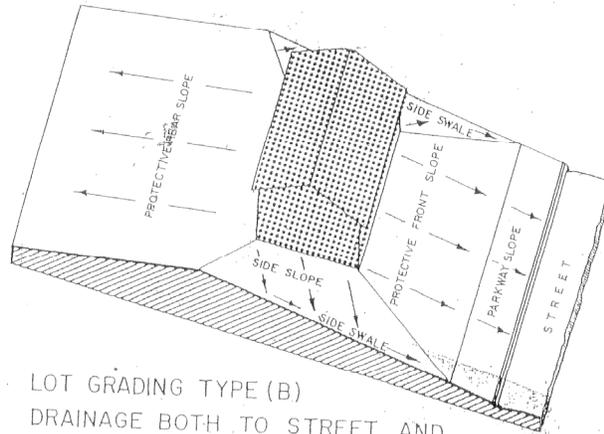
# Appendix 1



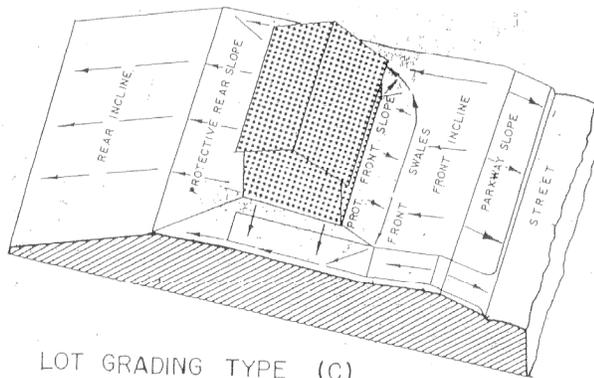
## Lot Grading Sketches



LOT GRADING TYPE (A)  
ALL DRAINAGE TO STREET

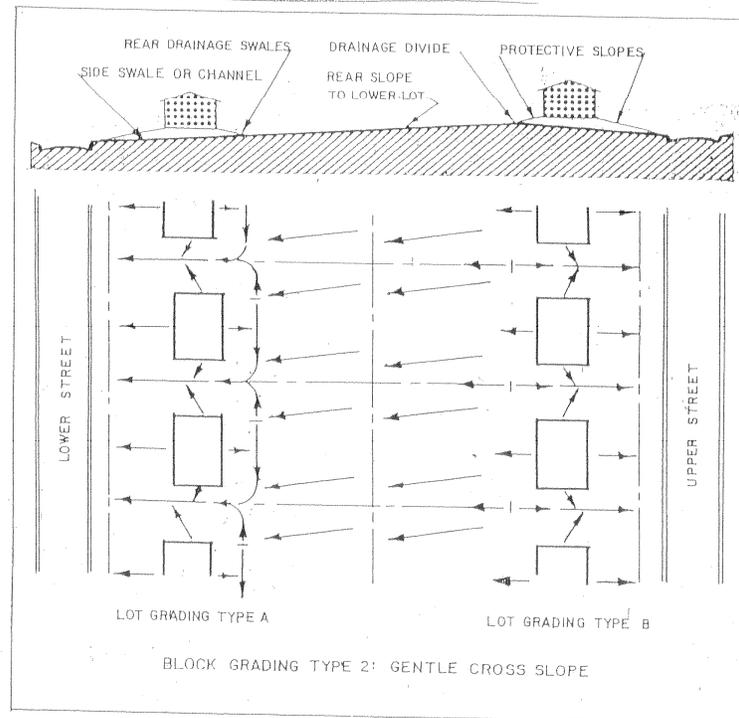
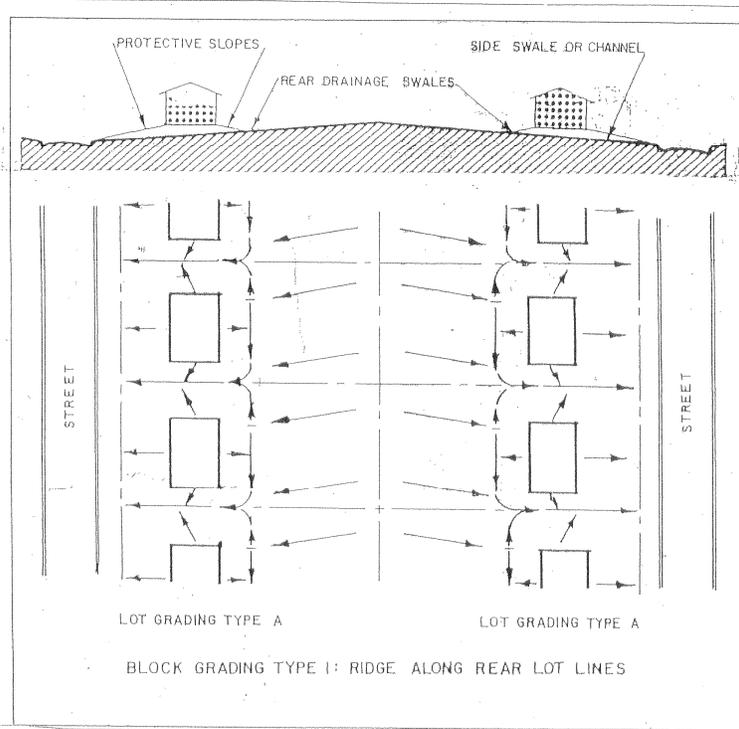


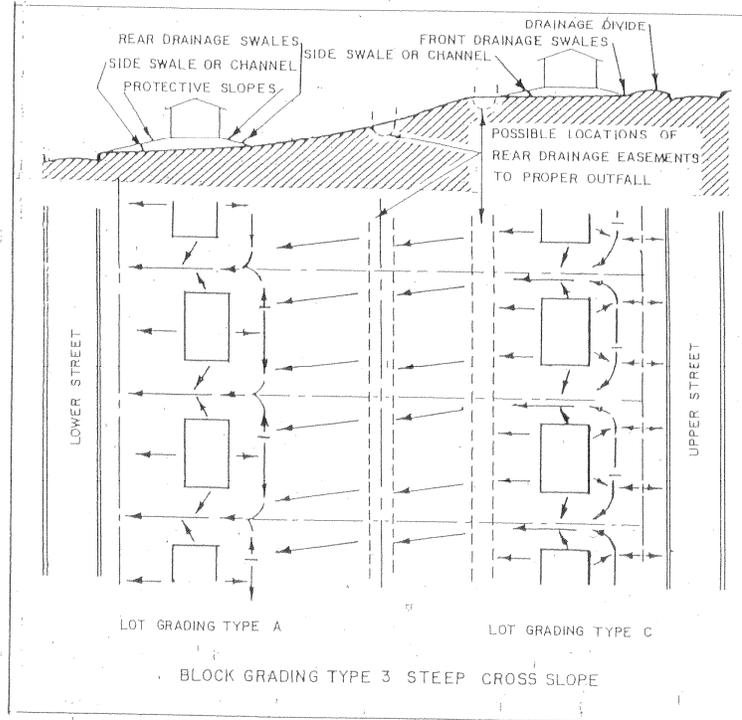
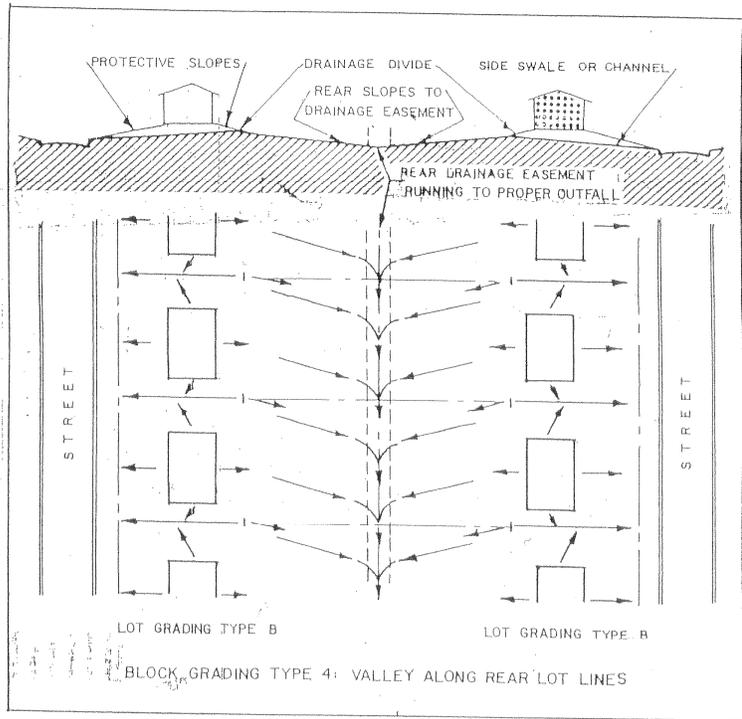
LOT GRADING TYPE (B)  
DRAINAGE BOTH TO STREET AND  
TO REAR LOT LINE



LOT GRADING TYPE (C)  
ALL DRAINAGE TO REAR LOT LINE

(LEAST DESIRABLE: CHECK WITH COMMUNITY BUILDING CODE)





# Appendix 2



## Sample Calculations

# SAMPLE CALCULATIONS

## Example Problem:

The proposed project is a 20 acre subdivision with a composite runoff coefficient of 0.35. There are 5 acres of off-site contributing acreage. The basin will have a permanent pool of water up to elevation 100.00' and the depth of storage will be approximately four feet. The proposed invert of the discharge pipe into the basin is 101.00'. The proposed invert of the restrictor is 99.50'. The outlet pipe for the basin is 24" diameter. Determine the following:

- 1) The volume required for the forebay, the median surface area and the size of the outlet, in order to dewater the forebay within 48 hrs.
- 2) The volume required for the detention basin and the size of the restricted outlet pipe.
- 3) The elevation and size of the basin overflow structure and the size of the overflow outlet pipe.
- 4) The size of a portion of storm drain on the site and the hydraulic grade line of the pipe run.

## Solution:

1)

**Volume of storage**  $V_r = 4,320 (0.35) (20ac)$   
 $V_r = 30,240 \text{ cuft}$

**Median surface area**  $A_m = V_r / 5 \text{ ft}$   
 $A_m = 6,048 \text{ sqft}$

**Size of outlet**  $a = (0.3988 (6,048) \sqrt{5}) / 172,800$   
 $a = 0.0312 \text{ sqft}$

- 2) The volume provided for the forebay can be counted as part of the volume required for the detention basin.

## Calculate volume required

$Q_{allow} = 4.00 \text{ cfs}$   
 $Q_o = 0.57$   
 $T = 109.51$   
 $V_s = 10936.49$   
 $V_t = 76555 \text{ cf}$   
 $V_{adj} = 76555 \text{ cf}$

## Estimate restrictor size using the orifice equation. The restrictor should be sized using on-site area only.

outlet inv. = 99.50  
 springline = 99.83  
 $h = 4.17 \text{ ft.}$   
 $a = 0.39 \text{ sf}$   
 $d = 6.67 \text{ in.}$   
 try outlet size = 8.00 in.

Make a chart to calculate the volume provided in the basin. The volume should be calculated in one foot increments starting at the permanent pool elevation. Calculate the actual outflow from the basin at each elevation.

elevation	Area	h	sum Vprov	ha	Qact
100.00	10000	0.00	0	0.17	0.709
101.00	20000	1.00	14714	1.17	1.876
102.00	30000	1.00	39546	2.17	2.556
103.00	40000	1.00	74426	3.17	3.091
<b>103.15</b>	41500	0.15	<b>80538</b>	3.32	3.163
104.00	50000	0.85	112597	4.17	3.545
105.00	freeboard	1.00			

Using the value for **Qact** at each elevation, calculate the volume required at each elevation. The elevation at which **Vreq** and **sum Vprov** are approximately equal is the storage elevation. Interpolate between elevations to find the values that are approximately equal.

elevation	Qo	T	Vs	Vreq
100.00	0.10	294.08	14016	98110
101.00	0.27	171.17	12562	87937
102.00	0.37	143.04	11956	83690
103.00	0.44	127.83	11543	80804
<b>103.15</b>	0.45	126.07	11491	<b>80436</b>
104.00	0.51	117.70	11225	78575
105.00	freeboard			

The overflow rim should be set at the 100-year storage elevation **103.15'**. At this elevation the actual flow out is less than the flow allowed, 4.00 cfs. Therefore, an 8" diameter restrictor is adequate.

3) Try a four foot diameter structure to start. The overflow structure will act as a weir. If the structure is near the bank of the basin, only approximately 50% of it's perimeter will be utilized. If the structure were located in the center of the basin, 100% of the perimeter would be used. The off-site contributing acreage is assumed to be undeveloped.

**Sizing Overflow Structure-**

size of overflow manhole:	<u>4.00</u> ft
% of MH that can be used as a weir:	<u>50.00</u> %
calculated length of weir =	<u>6.28</u> ft
acreage tributary to overflow (on + off site):	<u>25.00</u> ac
composite runoff coefficient =	<u>0.31</u>
longest time of flow to basin:	<u>25.00</u> min
(from pipe flow calculations)	
sum of all flow into basin (on + off-site):	<u>30.15</u> cfs
volume of basin (Vprov from detention calc's):	<u>80538</u> cf
storage elevation:	<u>103.15</u> ft
freeboard elevation:	<u>105.00</u> ft
time to fill basin= Vprov / flow into basin =	<u>44.52</u> min
l =	<u>1.85</u>
Qexp = CIA =	<u>14.35</u> cfs
Qweir=	3.33 (L) h <sup>1.5</sup>
calculate how high the water will rise above the overflow structure to pass the expected flow:	
h=	<u>0.78</u> ft
elevation of water during overflow conditions=	<u>103.93</u> ft

Is this elevation less than the freeboard elevation?  
 If yes, then the four foot diameter structure is large enough.

**Sizing Overflow Outlet Pipe-**

size of pipe:	<u>24.00</u> in
area =	<u>3.14</u> sf
invert of pipe:	<u>99.50</u> ft
springline=	<u>100.50</u> ft
h=	<u>2.65</u> ft
capacity, Q = 0.62* a* sqrt( 64.4* h) =	<u>25.45</u> cfs

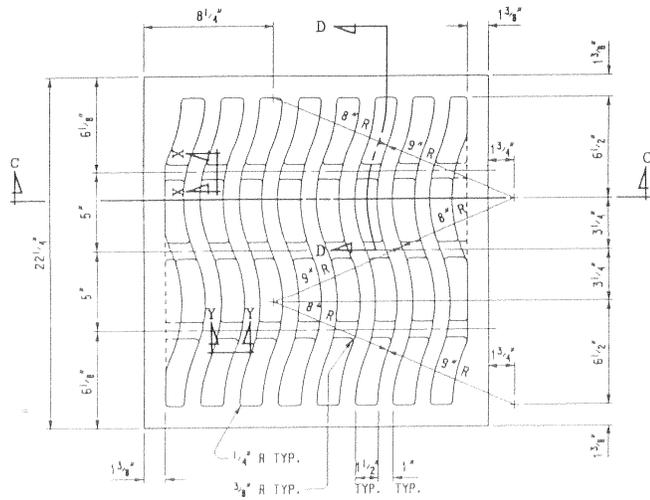
Is capacity of pipe greater than Qexp?  
 If no, then outflow pipe is not large enough.

# Appendix 3

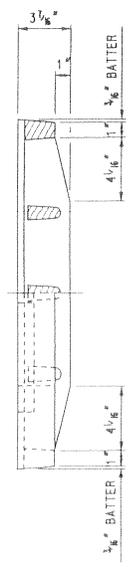


## MDOT Inlet Covers

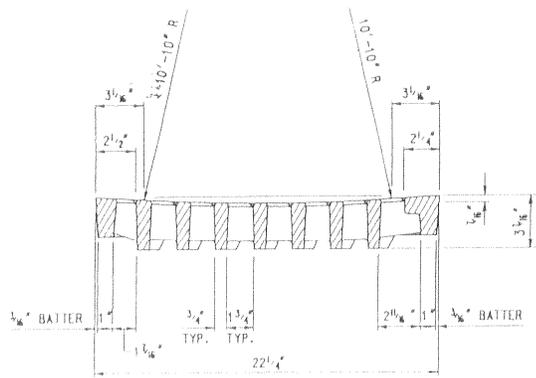




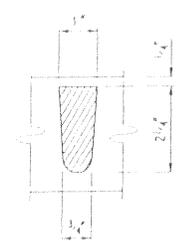
PLAN VIEW OF GRATE



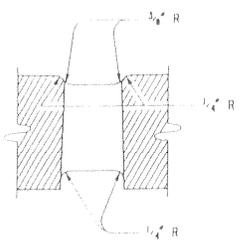
SECTION D - D  
HALF FRONT  
ELEVATION  
OF GRATE



SECTION C - C



SECTION X - X



SECTION Y - Y

NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS AASHTO M 105, AND SHALL HAVE A MINIMUM STRENGTH AS PROVIDED FOR CLASS NO. 30 GRAY IRON CASTINGS.

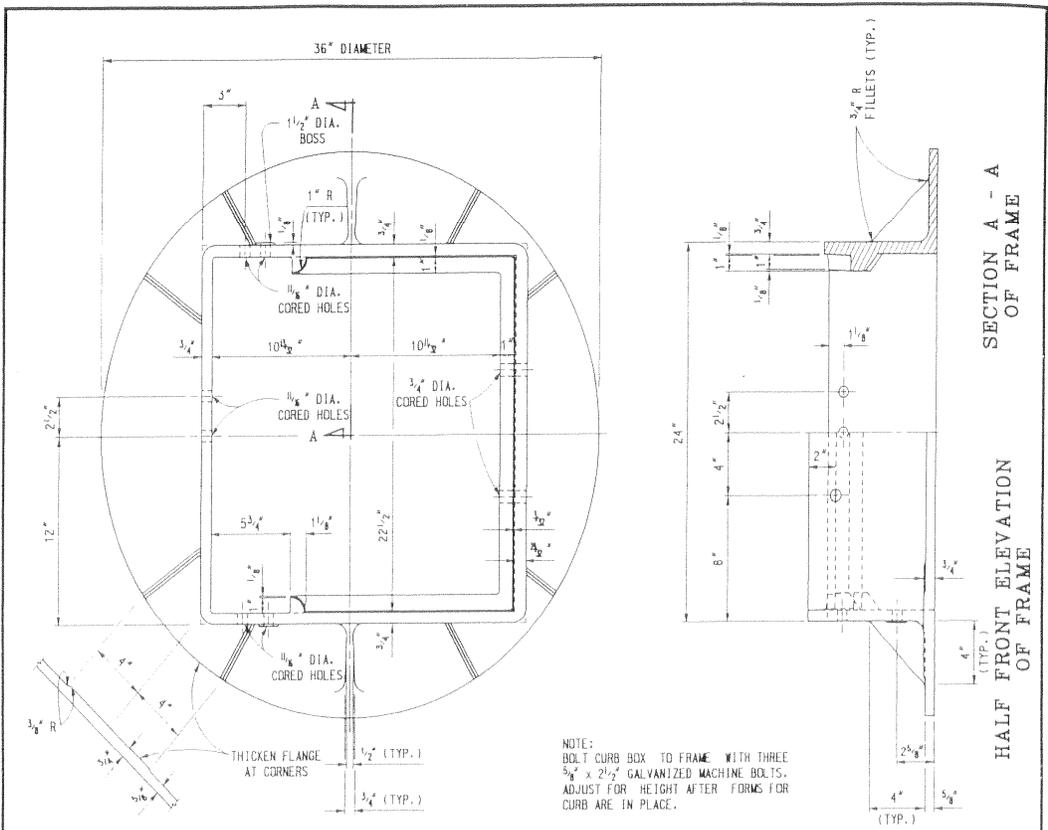
ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME AND THE CURB BOX SHALL BE GROUND SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

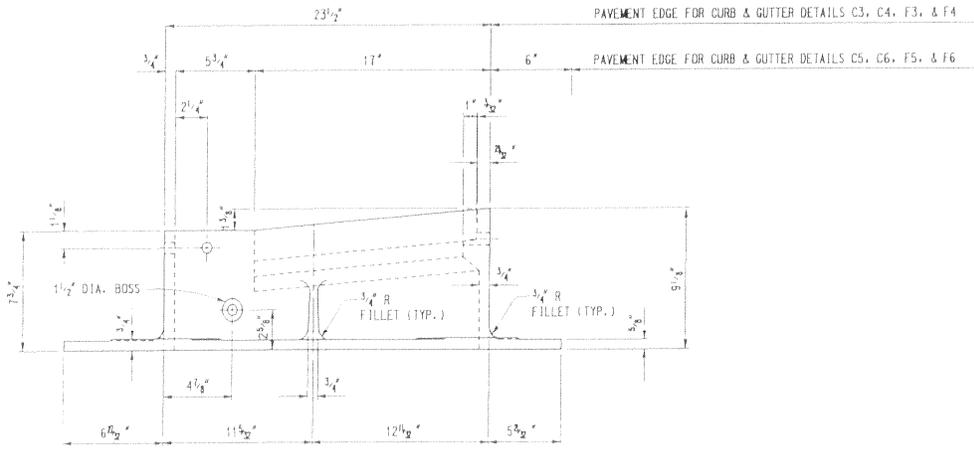
THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR <b>COVER D</b> FOR USE WITH STRAIGHT CURB AND CURB & GUTTER			
9-14-2001 F.H.T.A. APPROVAL	2-26-2001 PLAN DATE	R-9-B	SHEET 2 OF 2



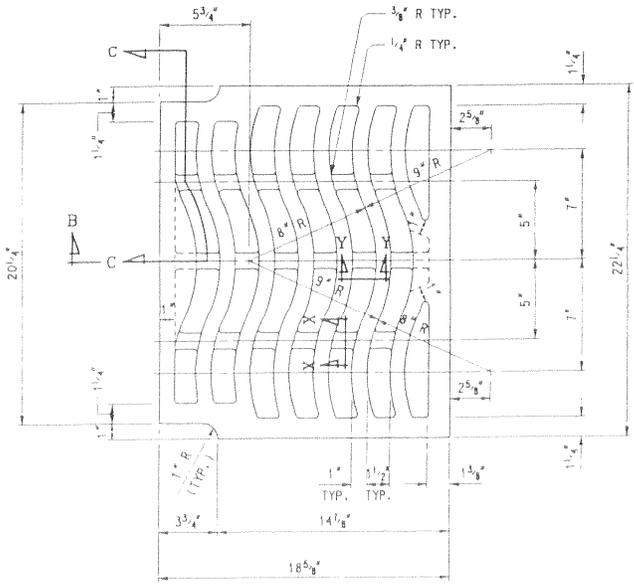
PLAN VIEW OF FRAME

NOTE:  
BOLT CURB BOX TO FRAME WITH THREE  
3/8" x 2 1/2" GALVANIZED MACHINE BOLTS.  
ADJUST FOR HEIGHT AFTER FORMS FOR  
CURB ARE IN PLACE.

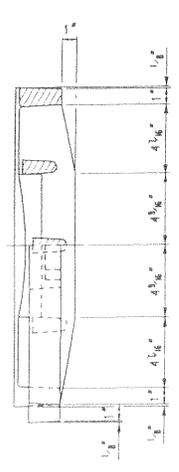


SIDE ELEVATION OF FRAME

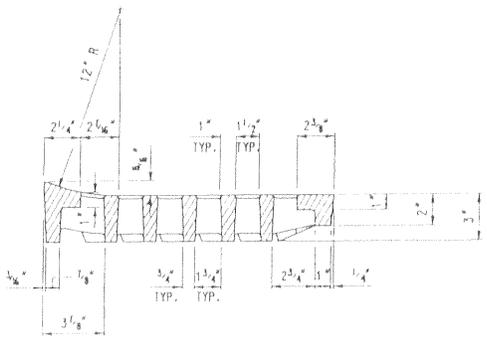
	<i>James D. Culp</i> ENGINEER OF CONSTRUCTION & TECHNOLOGY	ENGINEER - ROAD DESIGN <i>Robert J. Miller</i> ENGINEER OF DESIGN	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR	
	PREPARED BY DESIGN DIVISION DRAWN BY: B.L.T. CHECKED BY: C.A.L.	<i>Caewic Roberts</i> ENGINEER OF MAINTENANCE  <i>A. J. ...</i> ENGINEER OF TRAFFIC AND SAFETY	DEPARTMENT DIRECTOR Gregory J. Rosina  BY: <i>Gregory D. Sawyer</i> CHIEF ENGINEER/DEPUTY DIRECTOR BUREAU OF HIGHWAY TECHNICAL SERVICES	COVER K FOR USE WITH CONCRETE CURB & GUTTER DETAILS C3, C4, C5, C6, F3, F4, F5, & F6
			2-26-2001 PLAN DATE	R-15-C SHEET 1 OF 3



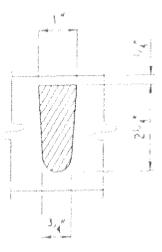
PLAN VIEW OF GRATE



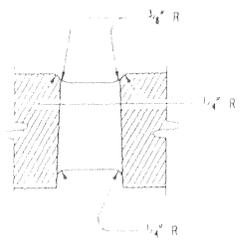
SECTION C - C  
ELEVATION  
OF GRATE



SECTION B - B



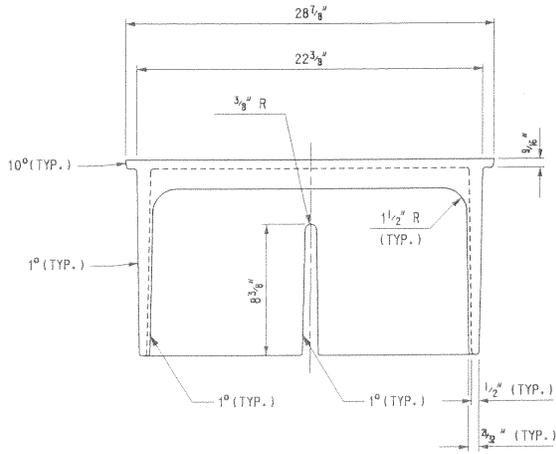
SECTION X - X



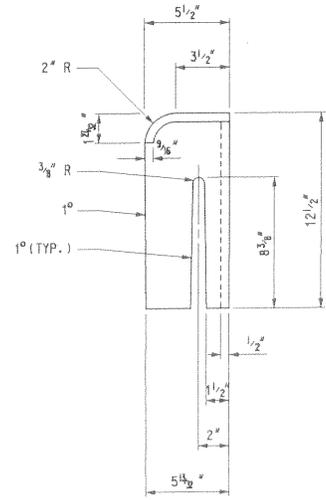
SECTION Y - Y

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR  
**COVER K**  
FOR USE WITH CONCRETE CURB & GUTTER  
DETAILS C3, C4, C5, C6, F3, F4, F5, & F6

3-14-2001 F.H.W.A. APPROVAL	2-26-2001 PLAN DATE	R-15-C	SHEET 2 OF 3
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FRONT VIEW OF CURB BOX



SIDE VIEW

NOTES:

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ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

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THE CURB BOX AND FRAME SHALL BE SHIPPED ASSEMBLED.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR

COVER K

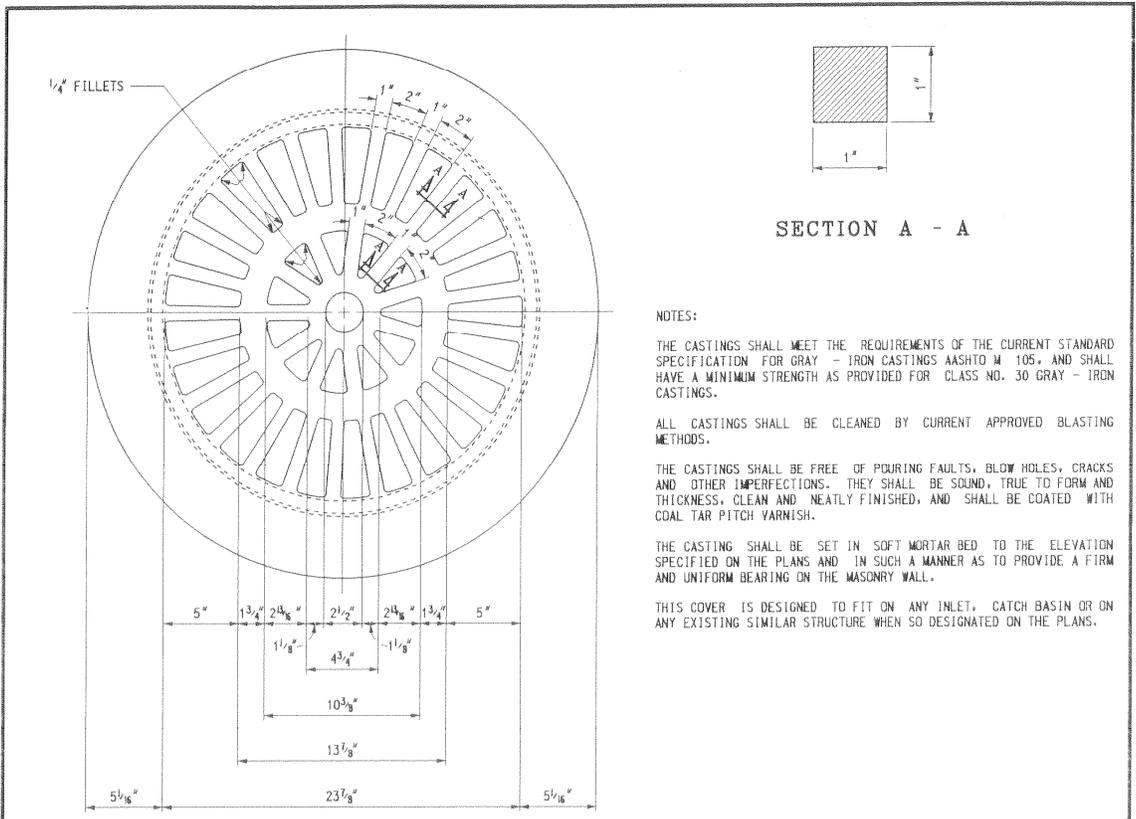
FOR USE WITH CONCRETE CURB & GUTTER  
DETAILS C3, C4, C5, C6, F3, F4, F5, & F6

9-14-2001  
F.H.W.A. APPROVAL

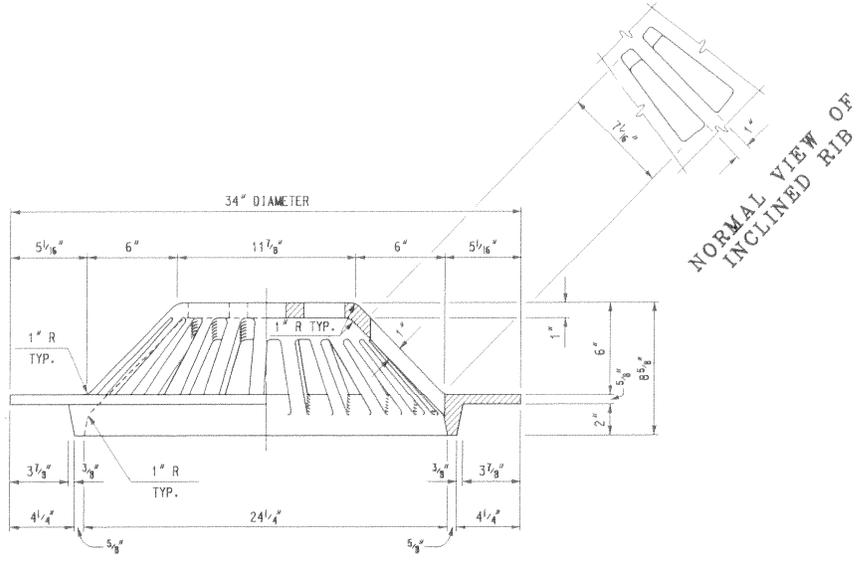
2-26-2001  
PLAN DATE

R-15-C

SHEET  
3 OF 3



PLAN VIEW



HALF ELEVATION      HALF SECTION

	<i>James D. Culp</i> ENGINEER OF CONSTRUCTION TECHNOLOGY	ENGINEER - ROAD DESIGN	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR <b>COVER E</b> FOR USE ON STRUCTURES IN DITCHES WHERE NOT SUBJECT TO TRAFFIC			
	<i>Calvin Roberts</i> ENGINEER OF MAINTENANCE	<i>Gregory J. Rosine</i> DEPARTMENT DIRECTOR Gregory J. Rosine				
PREPARED BY DESIGN DIVISION	<i>John S. Roberts</i> ENGINEER OF TRAFFIC AND SAFETY	<i>Gregory J. Rosine</i> CHIEF ENGINEER/DEPUTY DIRECTOR BUREAU OF HIGHWAY TECHNICAL SERVICES	9-14-2001 F.H.W.A. APPROVAL	2-26-2001 PLAN DATE	R-10-B	SHEET 1 OF 1

## Appendix 4

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# **“A Simple Method of Detention Basin Design”**

## **VII. A SIMPLE METHOD OF DETENTION BASIN DESIGN**

(By Glen Yrjanainen, P.E., Civil Engineer and Alan W. Warren, Engineering Technician)

### **A. INTRODUCTION**

Because development of land from agrarian to residential, commercial or industrial use continues to increase, the temporary storage of storm runoff in an onsite detention basin has become essential, due to inadequate outlets for the increased storm runoff created by development. In most cases, and primarily for economic reasons, adequately designed collector storm water systems (capable of handling the storm runoff from ultimate development) lag behind the development increases. Because of ever increasing construction costs and the infeasibility of installing large diameter storm drains, the concept of ultimate design or improvement of collector storm water systems is impractical. The detention basin that meters or restricts flow is here to stay.

### **B. THE USE OF CALCULUS**

If a detention basin were to have no outlet, all of the storm runoff would have to be stored. However, most detention basins do have an outlet, with the outflow depending upon the amount of water that is ponded and the depth of detention. The outflow is instantaneously changing as the head varies. This type of outlet can be analyzed by applying basic calculus to the controlling outflow equation. If the outflow is at a constant rate, i.e., a pump, the analysis is easier. The volume of storm water into the detention basin can be determined by the rational formula. The required storage volume is the volume of runoff that flows into the basin minus that which flows out.

An equation can be obtained that relates volume of storage to allowable outflow using the storage time as a parameter. This equation can then be maximized by basic calculus to find the peak storage time, which in turn can be used to calculate the maximum volume of storage required. The one assumption in this method is that storm water rises in the detention basin at a constant rate to fill the basin to the peak volume, and that the maximum allowable outflow is reached only at this peak volume, and then begins to recede.

The derivations of detention equations for detention basins with a gravity flow, changing rate orifice outlet, and a constant rate pump outlet follow. These derivations are for a ten-year frequency storm in the Oakland County, Michigan area. Detention equations for different year frequency storms and other areas can be obtained in the same manner.

### C. DERIVATION FOR AN ORIFICE OUTLET

#### 1. OUTFLOW

$$Q_i = ca\sqrt{2gh} \quad (\text{Orifice Formula})$$

Assume that the storm that fills the basin to the peak volume causes the water level to rise at a constant rate. ( $h = K_1t$ )

$$\begin{aligned} Q_i &= ca\sqrt{2gK_1t} \\ \text{Let } K_2 &= ca\sqrt{2gK_1} \\ Q_i &= K_2t^{1/2} \\ V_o &= 60 \int_0^T Q_i dt \end{aligned}$$

A conversion factor of 60 sec./min. is required because  $Q_i$  is in cfs and  $t$  is in minutes.

$$\begin{aligned} V_o &= 60K_2 \int_0^T t^{1/2} dt \\ V_o &= 60K_2T^{3/2} (2/3) \\ V_o &= 40K_2T^{1/2} (T) \end{aligned}$$

Assume the maximum outflow occurs only at the time of peak storage, such that  $Q_o = K_2T^{1/2}$

$$V_o = 40Q_oT$$

#### 2. INFLOW

$$\begin{aligned} Q_n &= CIA \quad (\text{Rational Formula}) \\ \text{Let } C &= 100\% \\ A &= 1 \text{ Acre} \\ I &= \frac{175}{T + 25} \\ Q_n &= (100\%) \frac{175}{T + 25} \quad (1) \\ Q_n &= \frac{175}{T + 25} \\ V_n &= Q_n (T) \quad (60 \text{ sec./min.}) \\ V_n &= \frac{10,500 T}{T + 25} \end{aligned}$$

### 3. STORAGE

$$V_s = V_n - V_o$$

$$V_s = \frac{10,500 T}{T + 25} - 40Q_o T$$

Since  $Q_o$  is a fixed maximum outflow that will only occur at peak storage, it is necessary to find the time from the instant the storage begins until the instant the peak storage is attained. This can be done by taking the first derivative of the storage volume equation and setting it equal to zero.

$$\frac{dV_s}{dT} = \frac{10,500 T}{T + 25} - \frac{d(40Q_o T)}{dT}$$

$$\frac{dV_s}{dT} = \frac{(T + 25)(10,500) - (10,500 T)(1)}{(T + 25)^2} - 40Q_o$$

$$\frac{dV_s}{dT} = \frac{262,500}{T^2 + 50T + 625} - 40Q_o = 0$$

$$T^2 = 50T + 625 - \frac{262,500}{40Q_o} = 0$$

This is a quadratic equation that may be reduced to the form:

$$ax^2 + bx + c = 0$$

$$\text{Where } x \text{ is } T, a = 1, b = 50 \text{ and } c = 625 - \frac{262,500}{40Q_o}$$

The general solution is:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$T = \frac{-50 \pm \sqrt{(50)^2 - 4(1) \left(625 - \frac{262,500}{40Q_o}\right)}}{2(1)}$$

$$T = \frac{-50 \pm \sqrt{2,500 - 2,500 + \frac{26,250}{40Q_o}}}{2}$$

$$T = -25 + \sqrt{\frac{6,562.5}{Q_o}}$$

#### D. DERIVATION FOR A CONSTANT RATE OUTLET

A basin with a constant outflow device, such as a pump, is simpler to derive. The constant outlet rate implies that the total outflow is merely the rate multiplied by the storage time.

$$V_o = 60Q_oT$$

$$V_s = V_n - V_o$$

$$V_s = \frac{10,500 T}{T + 25} - 60Q_oT$$

$$\frac{dV_s}{dT} = \frac{(T + 25)(10,500) - 10,500 T(1)}{(T + 25)^2} - 60 Q_o$$

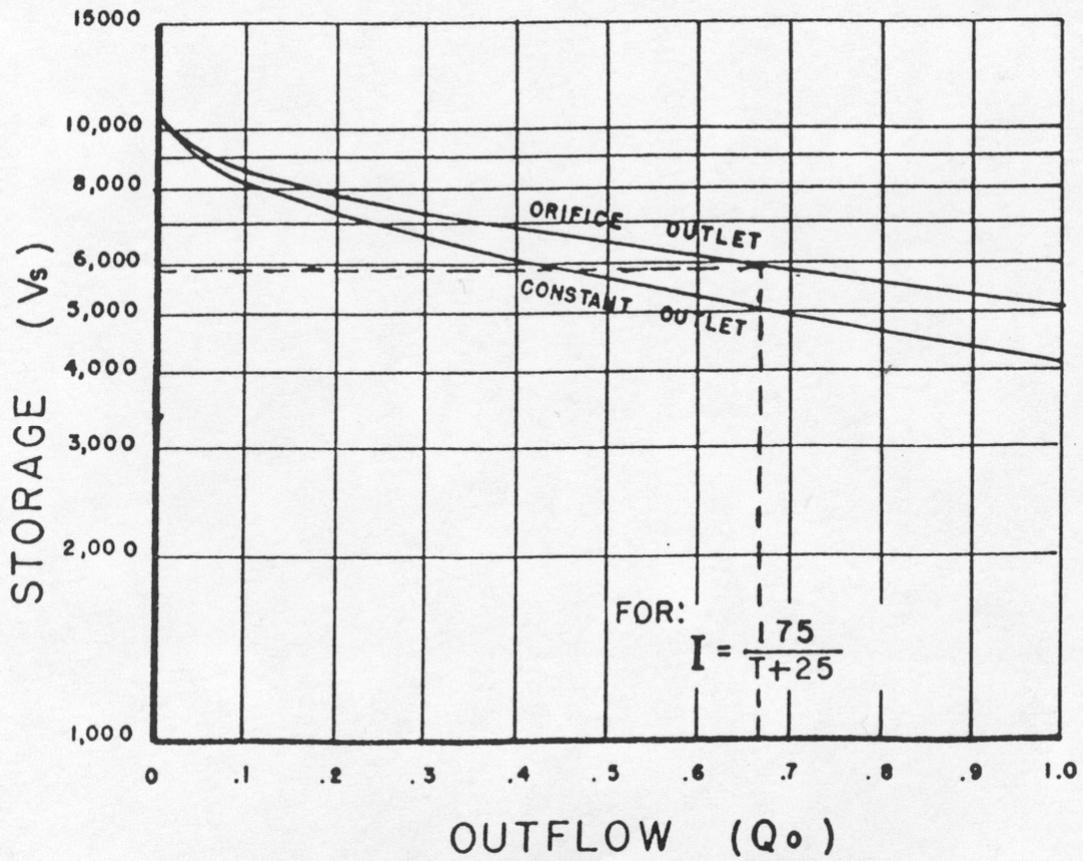
$$\frac{dV_s}{dT} = \frac{262,500}{T^2 + 50T + 625} - 60Q_o$$

$$T^2 + 50T + 625 - \frac{262,500}{60Q_o} = 0$$

$$T = -25 + \sqrt{\frac{4,375}{Q_o}}$$

#### E. GRAPHING THE DERIVATIONS

In both outlet situations the storage time to fill the basin to its maximum can be found as a function of the maximum outflow. The peak storage volume can then be found by substituting the storage time into the storage volume equation, reducing the storage volume equation to an equation with only one independent variable. This makes it possible to draw a graph of storage volume as a function of the maximum outflow rate. The included graph shows that as the outlet gets larger, the required storage volume decreases. The ideal basin will fall at a point on its respective curve. A basin that is oversized will fall at a point above its respective curve, and as a result, it will not reach its maximum outflow rate during the storm. An inadequate basin will fall at a point below its curve, and will rise above the design depth, producing more than the design outflow and possibly causing flooding. It should be pointed out that the constant rate system allows the least storage for a given size outlet. This is due to the fact that it functions at the maximum rate throughout the storm, while a gravity system has to head up before it will reach the maximum rate.



## F. TIME OF CONCENTRATION

It should be noted that no mention has been made of the time of concentration, which is defined as the flow time, in minutes, from the most remote point in the drainage area to the point in question. The reason for this is because it is assumed that runoff from the entire drainage area contributes to the detention basin immediately, and that the time of concentration is zero. This is a reasonable assumption that can be made for developments with relatively short times of concentration, such as subdivisions, multiples and parking lots. This assumption also makes this method of design conservative, since in actuality a certain volume of runoff will have already flowed out of the detention basin before the runoff from the most remote point of the drainage area arrives. As the time of concentration increases, this method of design becomes more conservative.

## G. DETENTION BASIN DESIGN PROCEDURE

1. Determine the amount of acreage (A) contributing runoff to the detention basin and its runoff coefficient (C).
2. Determine the maximum allowable outflow,  $Q_a$ , in CFS from the local municipal government regulations and/or the existing outlet conditions.
3. Calculate  $Q_o = \frac{\text{allowable outflow, } Q_a}{(\text{acreage}) (\text{runoff coefficient})}$
4. Determine the type of outlet that will be used. (orifice or pump)
5. Calculate the maximum storage time (T) from the storage time equation corresponding to the type of outlet selected in step 4.
6. Calculate the maximum storage ( $V_s$ ) from the storage equation corresponding to the type of outlet selected in step 4. ( $V_s$  will be in  $\text{ft}^3 / (\text{acres}) (\text{runoff coefficient})$ )
7. Calculate the total volume of storage required for the entire site. ( $V_t = (V_s) (C) (A)$ )
- 8a. If the outlet is to be a pump, select a depth of detention and a pump that will yield an outflow in CFS equal to the maximum allowable as determined in step 2.
- 8b. If the outlet is to be an orifice operating under a head, select a depth of detention and then use the orifice equation to calculate the cross-sectional area of outflow pipe required to outlet the allowable outflow, as determined in step 2, operating under a head equal to the depth of detention. After obtaining this cross-sectional area, the pipe diameter can be obtained.

Please be advised that the size of this outflow pipe may have to be increased if the outflow operates according to a Bernoulli analysis instead of as an orifice. If this is the case, then the outflow should be either (1) sized by the Bernoulli equation to yield the allowable outflow for the design depth or (2) the orifice condition should be created by selecting a larger size pipe than is calculated by the orifice equation, and then installing within this pipe a restriction plate containing an opening equal to the original cross-sectional calculated.

## H. EXAMPLE PROBLEM

In order to illustrate the use of the equations and graphs derived in this article, an example problem will be worked.

### 1. DESIGN CRITERIA

A 50-acre parcel of land is to be developed into a residential subdivision with a developed runoff coefficient of 0.30. An open ditch drain is available adjacent to this 50 acre parcel of land and can accept storm runoff at a rate of no greater than 10 CFS from the proposed subdivision. Sufficient grade is available to allow 6.5 feet depth of detention and a gravity flow orifice outlet. Determine (1) the volume of detention required, and (2) the size of outflow pipe required.

### 2. SOLUTION

- a. From the design criteria, calculate  $Q_o$

$$Q_o = \frac{\text{allowable outflow, } Q_a}{(\text{acreage}) (\text{runoff coefficient})}$$

$$Q_o = \frac{10 \text{ CFS}}{(50 \text{ ac}) (0.30)} = 0.667 \frac{\text{CFS}}{\text{acre imperviousness}}$$

- b. Calculate the storage time,  $T$ , in minutes, from the orifice outlet storage time equation.

$$T = -25 + \sqrt{\frac{6,562.5}{Q_o}}$$

$$T = -25 + \sqrt{\frac{6,562.5}{0.667}}$$

$$T = 74.22 \text{ min.}$$

- c. Calculate the maximum volume of storage per acre imperviousness,  $V_s$ , from the orifice outlet storage equation.

$$V_s = \frac{10,500 T}{T + 25} - 40Q_oT$$

$$V_s = \frac{10,500 (74.22)}{74.22 + 25} - 40 (0.667) (74.22)$$

$$V_s = 5,875.18 \text{ ft}^3 / \text{acre imperviousness}$$

- d. Calculate the total volume of storage,  $V_t$ , required for the entire site.

$$V_t = (V_s) (\# \text{ acres}) (\text{runoff coefficient})$$

$$V_t = 5,875.18 (50) (0.30)$$

$$V_t = 88,127.76 \text{ ft}^3$$

- e. Because of sufficient grade available, the design depth of detention is 6.5 feet. Now select an outflow pipe from the orifice formula that will yield the allowable outflow of 10 CFS operating under a head of 6.5 feet.

$$Q = 0.62 a \sqrt{2gh}$$

$$\text{Area} = \frac{Q}{0.62 \sqrt{2gh}} = \frac{10 \text{ CFS}}{0.62 \sqrt{64.4 \frac{\text{feet}}{\text{sec}^2} (6.5 \text{ feet})}}$$

$$\text{Area} = 0.785 \text{ ft}^2$$

Select a 12" diameter outflow pipe

- f. Plot the storage required per acre imperviousness ( $V_s$ ) versus the outflow per acre imperviousness ( $Q_o$ ) on the orifice outlet graph. One will see that it falls exactly on the curve.

## DETENTION BASIN DESIGN FORMULAS

### (Pump Outlet)

Frequency Of Storm	Rainfall Intensity	Storage Time Equation	Storage Volume Equation
1 Year	$\frac{72}{T+25}$	$T = -25 + \sqrt{\frac{1800}{Q_0}}$	$V_s = \frac{4320T}{T+25} - 60Q_0T$
5 Year	$\frac{145}{T+25}$	$T = -25 + \sqrt{\frac{3625}{Q_0}}$	$V_s = \frac{8700T}{T+25} - 60Q_0T$
10 Year	$\frac{175}{T+25}$	$T = -25 + \sqrt{\frac{4375}{Q_0}}$	$V_s = \frac{10500T}{T+25} - 60Q_0T$
25 Year	$\frac{215}{T+25}$	$T = -25 + \sqrt{\frac{5375}{Q_0}}$	$V_s = \frac{12900T}{T+25} - 60Q_0T$
50 Year	$\frac{245}{T+25}$	$T = -25 + \sqrt{\frac{6125}{Q_0}}$	$V_s = \frac{14700T}{T+25} - 60Q_0T$
100 Year	$\frac{275}{T+25}$	$T = -25 + \sqrt{\frac{6875}{Q_0}}$	$V_s = \frac{16500T}{T+25} - 60Q_0T$

### (Orifice Outlet)

Frequency Of Storm	Rainfall Intensity	Storage Time Equation	Storage Volume Equation
1 Year	$\frac{72}{T+25}$	$T = -25 + \sqrt{\frac{2700.0}{Q_0}}$	$V_s = \frac{4320T}{T+25} - 40Q_0T$
5 Year	$\frac{145}{T+25}$	$T = -25 + \sqrt{\frac{5437.5}{Q_0}}$	$V_s = \frac{8700T}{T+25} - 40Q_0T$
10 Year	$\frac{175}{T+25}$	$T = -25 + \sqrt{\frac{6562.5}{Q_0}}$	$V_s = \frac{10500T}{T+25} - 40Q_0T$
25 Year	$\frac{215}{T+25}$	$T = -25 + \sqrt{\frac{8062.5}{Q_0}}$	$V_s = \frac{12900T}{T+25} - 40Q_0T$
50 Year	$\frac{245}{T+25}$	$T = -25 + \sqrt{\frac{9187.5}{Q_0}}$	$V_s = \frac{14700T}{T+25} - 40Q_0T$
100 Year	$\frac{275}{T+25}$	$T = -25 + \sqrt{\frac{10312.5}{Q_0}}$	$V_s = \frac{16500T}{T+25} - 40Q_0T$

---

## Worksheet – Graphical Peak Method

### Worksheet - Graphical Peak Method

Project \_\_\_\_\_ By \_\_\_\_\_ Date \_\_\_\_\_

Location \_\_\_\_\_ Checked \_\_\_\_\_ Date \_\_\_\_\_

1. Pertinent Data:

Drainage area  $A =$  \_\_\_\_\_  $\text{mi}^2$

Runoff Curve Number(Tables 2-3)  $\text{RCN} =$  \_\_\_\_\_

Time of Concentration  $T_c =$  \_\_\_\_\_ hr.

Pond And Swamp Adjustment Area \_\_\_\_\_ percent

2. Rainfall Frequency \_\_\_\_\_ yr (2 year)

3. Rainfall, P (24-hour) Appendix B \_\_\_\_\_ in ( 2.24)

4. Initial Abstraction,  $I_a$ , Table 7.6 \_\_\_\_\_ in

5. Compute  $I_a/P$  \_\_\_\_\_

6. Unit peak discharge,  $q_u$ , Figure 7.10 \_\_\_\_\_ csm/in

7. Runoff,  $R_o$ (L.I.D. Manual, table 9.1 Zone 10) \_\_\_\_\_ in (0.90)

8. Swamp Adjustment Factor,  $F_p$ (Table 7.5) \_\_\_\_\_ percent

9. Peak discharge,  $q_p$  \_\_\_\_\_ cfs

(Where  $q_p = q_u A R_o F_p$ )

**Figure 7.11-Graphical Peak Discharge Method Worksheet**

(Source: Reference 46, TR-55, Second Edition, June 1986)

**WORKSHEET – GRAPHICAL PEAK METHOD**  
**MDEQ STORMWATER MANAGEMENT GUIDEBOOK**

PROJECT: Example	BY:	DATE:
LOCATION: Oakland County	CHECKED:	DATE:

Drainage Area (A), Square Miles:	0.0086 (5.5 acres)
Runoff Curve Number (RCN):	92
Time of Concentration (Tc), Hours:	0.25
Pond and Swamp Areas, % :	0
Rain Event Return Frequency (Year, Duration):	2 Year, 24 Hour
Rainfall Data, P (24 hour), Appendix C (in)	2.24
Initial Abstraction (Ia) Table 7.6:	0.174
Ia/P:	0.07768
Unit Peak Discharge (qu), Figure 7.10:	750 (Interpolated)
Runoff (Ro):	0.9 (From SEMCOG LID Manual, Table 9.1, Area 10)
Pond and Swamp Adjustment Factor (Fp): (See Table 7.5)	1
Peak Discharge (qp): Where: $qp = au * Ro * Fp$	5.81 cfs

APPENDIX B

RAINFALL FREQUENCY FOR MICHIGAN

Figure No.

- B.1 2-year, 24-hour Rainfall
- B.2 5-year, 24-hour Rainfall
- B.3 10-year, 24-hour Rainfall
- B.4 25-year, 24-hour Rainfall
- B.5 50-year, 24-hour Rainfall
- B.6 100-year, 24-hour Rainfall

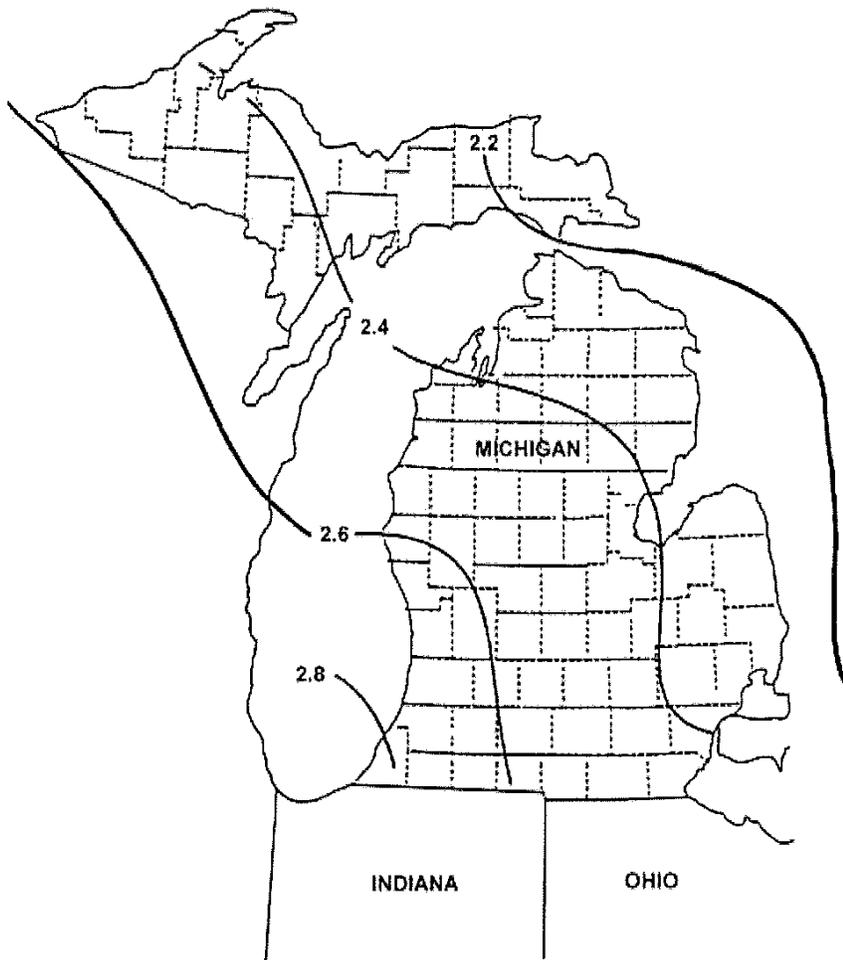


Figure B.1 - 2-year, 24-hour Rainfall

Table 7.6 - *la* values for runoff curve numbers

Curve urnbe[	<i>la</i> (ia)	Curve umbec	<i>la</i> (iD)	Curve umbe[	<i>la</i> (ia)	Curve UDJbe[
40	3.000	55	1.636	70	0.857	85
41	2.878	56	1.571	71	0.817	86
42	2.762	57	1.509	72	0.778	87
43	2.651	58	1.448	73	0.740	88
44	2.545	59	1.390	74	0.703	89
45	2.444	60	1.333	75	0.667	90
46	2.348	61	1.279	76	0.632	91
47	2.255	62	1.226	77	0.597	92
48	2.167	63	1.175	78	0.564	93
49	2.082	64	1.125	79	0.532	94
50	2.000	65	1.077	80	0.500	95
51	1.922	66	1.030	81	0.469	96
52	1.846	67	0.985	82	0.439	97
53	1.774	68	0.941	83	0.410	98
54	1.704	69	0.899	84	0.381	

Source: Reference 46, TR-55, Second Edition, June 1986

Example 7.7: The basin has a RCN of 75, a precipitation of 5.1 inches, Type II rainfall distribution, and 2.79 sq.mi-inches of runoff. The *t<sub>c</sub>* is 1.43 hours, compute the unit peak discharge.

For a RCN = 75, from Table 7.6, the initial abstraction (*la*) is .667 inches. *la*/*P* =

$$0.667/5.1 = 0.13$$

From figure 7.10, interpolating between *la*/*P*= 0.1 and 0.3, to *la*/*P* = 0.13, the unit peak discharge *q<sub>p</sub>* is 280 cfs/square mile-inch.

Just like the UD-21 method, the peak flow can be determined by using equation 22:

$$\begin{aligned} Q &= q_p \times \text{surface runoff} \\ &= 280 \text{ cfs/sq.mi.-inch} \times 2.79 \text{ sq.mi.-inch} \\ &= 780 \text{ cfs} \end{aligned}$$

#### 4. Swamp and Pond Adjustment Factor

As in the UD-21 methodology, it is necessary to adjust the peak flow if there is ponding or swampy areas within the drainage basin. Table 7.5 that was used in the UD-21 method is also applicable to TR-55.

A sample work sheet for using the TR-55 graphical peak method is given in Figure 7.11.

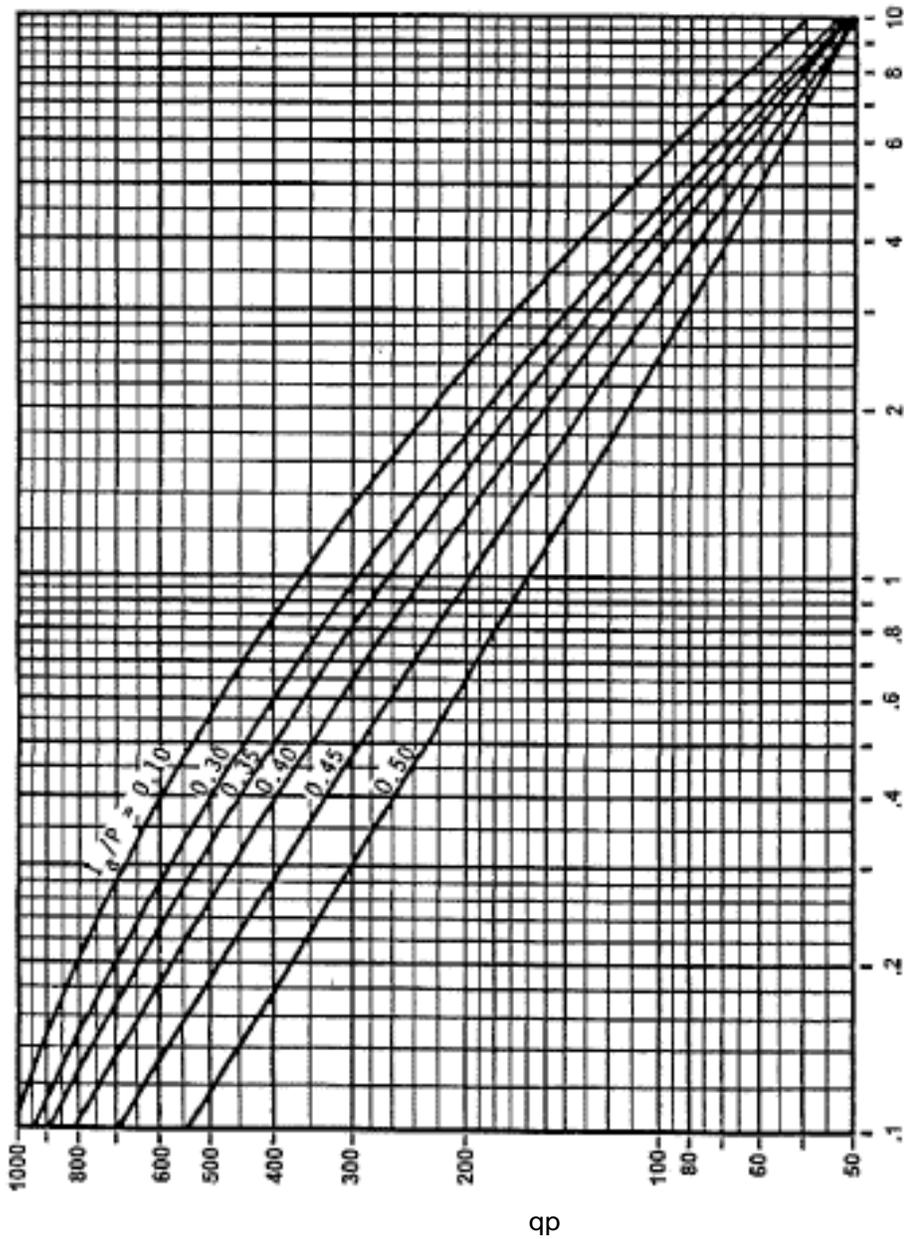


Figure 7.10-Unit Peak Discharge ( $q_p$ )

Time in Hours  $T_c$   
 Figure 7.10-Unit Peak Discharge ( $q_p$ ) SCS Type II Rainfall Distribution

(Source: reference 46)

Table 2-3a.—Runoff curve numbers for cultivated agricultural lands<sup>1</sup>

Cover description			Curve numbers for hydrologic soil group—			
Cover type	Treatment <sup>2</sup>	Hydrologic condition <sup>3</sup>	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row	Poor	72	81	88	91
		Good	67	78	85	89
	Straight row + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	Contoured + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	Contoured & terraced + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	Straight row	Poor	65	76	84	88
		Good	63	75	83	87
	Straight row + CR	Poor	64	75	83	86
		Good	60	72	80	84
	Contoured	Poor	63	74	82	85
		Good	61	73	81	84
	Contoured + CR	Poor	62	73	81	84
		Good	60	72	80	83
	Contoured & terraced	Poor	61	72	79	82
		Good	59	70	78	81
	Contoured & terraced + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	Straight row	Poor	66	77	85	89
		Good	58	72	81	85
	Contoured	Poor	64	75	83	85
		Good	55	69	78	83
	Contoured & terraced	Poor	63	73	80	83
		Good	51	67	76	80

<sup>1</sup>Average runoff condition.

<sup>2</sup>Crop residue cover (CR) applies only if residue is on at least 5% of the surface throughout the year.

<sup>3</sup>Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good  $\geq$  20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.  
Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-3b.—Runoff curve numbers for other agricultural lands<sup>1</sup>

Cover description	Hydrologic condition	Curve numbers for hydrologic soil group—			
		A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. <sup>2</sup>	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. <sup>3</sup>	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 <sup>4</sup>	48	65	73
Woods-grass combination (orchard or tree farm). <sup>5</sup>	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods <sup>6</sup>	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 <sup>4</sup>	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

<sup>1</sup>Average runoff condition.

<sup>2</sup>Poor: <50% ground cover or heavily grazed with no mulch.

Fair: 50% to 75% ground cover and not heavily grazed.

Good: >75% ground cover and lightly or only occasionally grazed.

<sup>3</sup>Poor: <50% ground cover.

Fair: 50 to 75% ground cover.

Good: >75% ground cover.

<sup>4</sup>Actual curve number is less than 30; use CN = 30 for runoff computations.

<sup>5</sup>CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

<sup>6</sup>Poor: Forest, litter, small trees, and brush have been destroyed by heavy grazing or regular burning.

Fair: Woods are grazed but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-3c.—Runoff curve numbers for arid and semiarid rangelands<sup>1</sup>

Cover description	Hydrologic condition <sup>2</sup>	Curve numbers for hydrologic soil group—			
		A <sup>3</sup>	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

<sup>1</sup> Average runoff condition. For rangelands in humid regions, use table 2-3b.

<sup>2</sup> Poor: <30% ground cover (litter, grass, and brush overstory).  
Fair: 30% to 70% ground cover.  
Good: >70% ground cover.

<sup>3</sup> Curve numbers for group A have been developed only for desert shrub.

Table 2-3d.—Runoff curve numbers for urban areas<sup>1</sup>

Cover description	Average percent impervious area <sup>2</sup>	Curve numbers for hydrologic soil group—			
		A	B	C	D
<b>Cover type and hydrologic condition</b>					
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) <sup>3</sup> :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) <sup>4</sup>		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) <sup>5</sup>		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2a).					

<sup>1</sup> Average runoff condition.

<sup>2</sup> The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

<sup>3</sup> CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

<sup>4</sup> Composite CN's for natural desert landscaping should be computed based on the impervious area (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

<sup>5</sup> Composite CN's to use for the design of temporary measures during grading and construction should be computed using the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

**Table 7.5 - Swamp Adjustment Factors**

<b>A. -- Ponding and swampy areas are at the design point</b>							
Ratio of drainage area to ponding and swampy area	Percentage of ponding and swampy area	Storm frequency (years)					
		2	5	10	25	50	100
500	00.2	0.92	0.94	0.95	0.96	0.97	0.98
200	00.5	0.86	0.87	0.88	0.90	0.92	0.93
100	01.0	0.80	0.81	0.83	0.85	0.87	0.89
050	02.0	0.74	0.75	0.76	0.79	0.82	0.86
040	02.5	0.69	0.70	0.72	0.75	0.78	0.82
030	03.3	0.64	0.65	0.67	0.71	0.75	0.78
020	05.0	0.59	0.61	0.63	0.67	0.71	0.75
015	06.7	0.57	0.58	0.60	0.64	0.67	0.71
010	10.0	0.53	0.54	0.56	0.60	0.63	0.68
005	20.0	0.48	0.49	0.51	0.55	0.59	0.64

<b>B. -- Ponding and swampy areas are spread throughout the watershed or occur in central parts of the watershed.</b>							
Ratio of drainage area to ponding and swampy area	Percentage of ponding and swampy area	Storm frequency (years)					
		2	5	10	25	50	100
500	00.2	0.94	0.95	0.96	0.97	0.98	0.99
200	00.5	0.88	0.89	0.90	0.91	0.92	0.94
100	01.0	0.83	0.84	0.86	0.87	0.88	0.90
050	02.0	0.78	0.79	0.81	0.83	0.85	0.87
040	02.5	0.73	0.74	0.76	0.78	0.81	0.84
030	03.3	0.69	0.70	0.71	0.74	0.77	0.81
020	05.0	0.65	0.66	0.68	0.72	0.75	0.78
015	06.7	0.62	0.63	0.65	0.69	0.72	0.75
010	10.0	0.58	0.59	0.61	0.65	0.68	0.71
005	20.0	0.53	0.54	0.56	0.60	0.63	0.68
004	25.0	0.50	0.51	0.53	0.57	0.61	0.66

<b>C. -- Ponding and swampy areas are located only in the upper reaches of the watershed.</b>							
Ratio of drainage area to ponding and swampy area	Percentage of ponding and swampy area	Storm frequency (years)					
		2	5	10	25	50	100
500	00.2	0.96	0.97	0.98	0.98	0.99	0.99
200	00.5	0.93	0.94	0.94	0.95	0.96	0.97
100	01.0	0.90	0.91	0.92	0.93	0.94	0.95
050	02.0	0.87	0.88	0.88	0.90	0.91	0.93
040	02.5	0.85	0.85	0.86	0.88	0.89	0.91
030	03.3	0.82	0.83	0.84	0.86	0.88	0.89
020	05.0	0.80	0.81	0.82	0.84	0.86	0.88
015	06.7	0.78	0.79	0.80	0.82	0.84	0.86
010	10.0	0.76	0.77	0.78	0.80	0.82	0.84
005	20.0	0.74	0.75	0.76	0.78	0.80	0.82

**APPENDIX H**  
**Pollution Prevention and Good Housekeeping**

# STANDARD OPERATING PROCEDURE POLLUTION PREVENTION AND GOOD HOUSEKEEPING

## GENERAL PROCEDURES

THE CITY OF BLOOMFIELD HILLS  
45 E. LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN 48304



MARCH 2016

## SECTION A – PURPOSE

The Michigan Department of Environmental Quality (MDEQ) National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase II Stormwater Discharge Permit Application requires a description of current and proposed BMPs to meet the minimum control measure requirements for the Pollution Prevention and Good Housekeeping Program to the maximum extent practicable to prevent or reduce the discharge of pollutants from municipal facilities and operations.

## SECTION B – FACILITY ASSESSMENT AND PRIORITIZATION

City owned and operated facilities have been assessed for their potential to discharge pollutants to the waters of the state. Each facility was evaluated based on the following criteria:

1. Amount of urban pollutants stored at the site (i.e. sediment, nutrients, metals, hydrocarbons, pesticides, fertilizers, herbicides, chlorides, trash, bacteria, or other site-specific pollutants)
2. Identification of improperly stored materials
3. Potential for polluting activities to be conducted outside (i.e. vehicle washing)
4. Proximity to waterbodies
5. Poor housekeeping practices
6. Discharge of pollutants of concern to impaired waters

Based on these criteria, the potential for each facility to discharge pollutants to the waters of the state were rated high, medium, or low. For “low” priority facilities where no assessment factors are present, catch basin cleaning and street sweeping will be performed as indicated in the applicable procedures for these activities. For “medium” priority facilities, appropriate BMPs are considered based on the assessment factors present to prevent or minimize the potential for pollutants from entering surface waters of the state. “High” priority facilities have specific procedures that are included in Appendices K and L of the Storm Water Management Plan (SWMP).

## SECTION C – UPDATES AND PRIORITY REVISION

This inventory shall be updated within 120 days as facilities and structural stormwater controls are added, removed, or no longer owned or operated by the applicant. Priority level assessments shall be revised within 120 days prior to discharging stormwater at a new facility, or when the storage of materials, equipment, or vehicles changes at a facility.

## SECTION D – MUNICIPAL INVENTORY AND ASSESSMENT

The following table identifies the City’s owned or operated facilities with a discharge of stormwater to surface waters of the state. **Table 1** includes a list of properties owned or operated by the City that has stormwater controls on site and provides the estimated number of stormwater structural controls (i.e. catch basins, detention basins, etc.) at each site, along with the priority level of potential discharge of pollutants to waters of the state. **Table 2** provides a listing of other properties that are owned and operated by the City but do not have any

stormwater controls. In general, sites listed on Table 2 are vacant, residential parcels, or conservation easements.

**Table 1**

Facility Name	Structural Controls	Priority Level	Assessment Factors	BMP's Implemented
Administration Building/Public Safety	Catch Basins (7) Detention Basin (1) Oil/Water Separator (1)	Med	0	Catch basin cleaning Street sweeping See Section E
Public Works Facility	Catch Basins (9) Oil/Water Separator (1)	High	1,3	See Section E See SWPPP
Cranbrook Facilities Area	Catch Basins (32) Storm Manholes (35) Underground Storage Tank (1)	High	1,3	See Section E See Cranbrook PIPP
Structural Storm Water Controls		Quantity		
City Catch Basins		1,400		
City Outfalls		64		
City Detention Basins		1		
City Rain Gardens		2		
City Secondary Containment		1		

**Table 2**

Facility Name	Structural Controls	Priority Level	Assessment Factors	BMP's Implemented
None				

## SECTION E –SITE SPECIFIC SOP FOR HIGH PRIORITY SITES

The MDEQ NPDES Phase II Stormwater Discharge Permit Application requires a standard operating procedure (SOP) for identifying the structural and non-structural stormwater controls implemented and maintained to prevent or reduce pollutant runoff at each facility with the high potential for pollutant runoff.

### E.1 Inventory and Description of Materials and Activities

The City of Bloomfield Hill’s Department of Public Works (DPW) operations is conducted at their 1805 Kensington Road facility. The City also operates a salt dome, brine storage, and materials piles on the Cranbrook Educational Community operations yard at 19 Valley Way. These sites are considered high priority sites due the following operations:

#### **DPW Facility – 1805 Kensington Road**

- Maintenance and cleaning of vehicles and equipment

#### **Cranbrook Educational Community Operations Yard – 19 Valley Way**

- Salt Storage
- Brine Storage
- Stockpiled materials

## **E.2 Vehicle Washing and Maintenance**

Vehicle maintenance activities are conducted by DPW staff for the City's public works vehicle fleet. Maintenance activities conducted by DPW staff include, but are not limited to, oil changes and other vehicle fluids, brakes, tune ups, and general repair tasks. These activities are carried out indoors where the floor drains are connected to the sanitary sewer system. A maintenance log is maintained to document all vehicle maintenance and repair activities.

Vehicle washing activities for the public works and fire trucks are conducted indoors where the vehicle wash water is discharged into floor drains that are connected to the sanitary sewer system. The police vehicles are washed at a commercial car wash.

Site specific standard operating procedures have been developed for these facilities and are included as separate documents. Please see DPW Facility Storm Water Pollution Prevention Plan, and the Cranbrook Educational Community Pollution Incident Prevention Plan.

## **SECTION F –CATCH BASIN MAINTENANCE PRIORITY**

Catch basins that are inspected and maintained by the City have been prioritized for routine inspection, maintenance, and cleaning. The criteria for the priority levels that include low, medium, and high are defined as follows:

**Low Priority** – Catch basins that are of low priority have very little sediment accumulation and do not require routine maintenance. Low priority catch basins are inspected on an as needed basis based on complaints or by DPW staff during normal work activities.

**Medium Priority** – Catch basins that are of medium priority have a higher rate of sediment accumulation and will require maintenance more frequently than low priority catch basins.

**High Priority** – Catch basins that are of high priority have a high rate of sediment accumulation and will require regular routine maintenance and inspection. These catch basins are typically located in areas where sediment is easily mobilized and transported by runoff.

The Trowbridge Farms development on the east side of Woodward Avenue contains catch basins located within gravel roads. These structures are medium priority. All other catch basins have very little sediment accumulation rates, require little maintenance and are of low priority. Catch basins that prompt resident complaints or are subject to isolated instances where structures are plugged or damaged will be maintained and inspected by DPW as needed. At that time, it will be

determined if the catch basin will require maintenance on a more frequent interval and warrants a reclassification to a medium priority rating. In the event the priority rating of a catch basin is changed, or new catch basins are constructed, this procedure will be updated and revised to reflect the change in priority within 120 days.

## **SECTION G – CATCH BASIN INSPECTION, MAINTENANCE, AND CLEANING**

Catch basins are visually inspected during normal work activities or if a complaint is registered by a resident. A visual inspection of the structure will identify any structural defects which may include collapse, cracking, frame damage, pipe collapse, blockage, etc. and will be documented. Structure repairs are prioritized based on public safety concerns. Catch basin structures in need of structural repairs are identified during the inspection and regular maintenance process based on the results of visual assessments conducted by the City. At that time, it will be determined if the catch basin will require maintenance on a more frequent interval and warrants a reclassification to a medium priority rating. In the event the priority rating of a catch basin is changed, or new catch basins are constructed, this procedure will be updated and revised to reflect the change in priority within 120 days. City owned catch basins are inspected concurrently with cleaning activities annually, between April and November. City cleans catch basins when the sediment in the sump is no more than 50% full. The City will inspect medium priority areas once a year. The City will inspect 20% of catch basins in low priority areas once a year and will proceed to clean them if the sediment in the sump is no more than 50% full. The City is basing this schedule on their knowledge of their storm water system and its usage. During these inspections it will be determined if the catch basin will require maintenance on a more frequent interval and warrants a reclassification to a medium priority rating.

A vacor truck is used to remove all solids and liquids from the structure to the extent possible. At no time is collected sediment and water allowed to be discharged back into the storm sewer system during the cleaning process. Catch basins that are located on private property are not inspected, cleaned, or maintained by the City.

## **SECTION H – DISPOSAL OF COLLECTED MATERIAL**

Collected material from catch basin maintenance and street sweeping activities are disposed of by the contractor who conducts the cleaning. Collected material from street sweeping activities are transported by the City to a landfill for disposal.

## **SECTION I – STREET SWEEPING PRIORITIZATION**

City owned and maintained streets will be prioritized for street sweeping. The criteria for the priority levels that include low, medium, and high are defined as follows:

**Low Priority** – Residential streets within the City are of low priority due to their minimal sediment accumulation rates. They are generally swept at least three times per year.

**Medium Priority** – Major roads throughout the City are of medium priority due to the higher rate of sediment accumulation rates in comparison to low priority residential streets. Medium priority areas are generally swept seven to eight times per year.

**High Priority** – Areas that are of high priority have a high rate of sediment accumulation and will require regular, frequent sweeping. These areas are typically located in areas where sediment is easily mobilized and transported by runoff. Additionally, areas that prompt resident complaint or are subject to excessive road sediments are also considered a high priority area. There are currently no areas that have been assigned a high priority rating due to excessive road sediments and resident complaints. However, if DPW receives a complaint, a determination of the area will be made by DPW staff to increase sweeping on a more frequent interval as well as a reclassify the area to high priority rating.

In the event a priority rating is changed, or new City owned streets are constructed, this procedure will be updated and revised to reflect the change in priority within 30 days.

Street sweeping activities are conducted by City of Bloomfield Hills DPW staff using mechanical equipment. Street and parking lot sweeping activities are conducted between April and November. Administration Building/Public Safety parking lot is medium priority. Curbed cul-de-sac areas within the City are of Medium Priority. All other streets are low priority. The City does not have any high priority streets at this time.

Collected sediment from street sweeping activities is disposed of as described in Section H. Street sweeping program activities are not implemented under the following conditions:

- Street sweeping is not conducted on County or State roads
- Sweeping activities are not conducted during wet and inclement weather
- Street sweeping activities is not conducted on private streets, uncurbed streets, or private parking lots

## **SECTION J – OTHER STRUCTURAL STORMWATER CONTROLS**

In addition to implementing the catch basin maintenance and street sweeping programs, the City also performs inspections of other stormwater structural controls that are located throughout the City.

### **J.1 Detention Basin**

The routine procedure for the detention basins at the DPW facility is the inspection of the inlet pipes and the outlet structure for blockages as part of the biannual comprehensive inspection of the DPW. Should the detention basin need to be graded or dredged to maintain it, the spoils will be tested for proper disposal.

## J.2 Rain Gardens

The City currently owns and operates two (2) rain gardens located at the intersection of Barden and Keswick Roads. Annual inspections are conducted by the City for debris and sediment accumulation. They are maintained by City staff and volunteer residents who are Master Gardeners.

The City does not have any other structural controls that are owned or maintained by the City. In the event additional structural stormwater controls are constructed, this procedure will be updated and revised to include the new controls within 120 days.

## SECTION K – NEW APPLICANT OWNED FACILITIES

In the event the City acquires or constructs new structural stormwater controls, the design of these structures will comply with the stormwater standards that have been established by Oakland County. Site plans will be reviewed by the City, or its consultants, to ensure the appropriate standards are met.

## SECTION L – CERTIFIED PESTICIDE APPLICATOR

The DPW department does not have a certified pesticide applicator on staff and does not apply or store pesticides or fertilizers. In the event the application of pesticides or fertilizers is needed, the City will retain the services of a licensed applicator.

## SECTION M – EMPLOYEE TRAINING

Employee training programs will be implemented to inform appropriate personnel at all levels of responsibility of safety, environmental impacts, and good housekeeping practices. The City participates in training opportunities that are made available by SEMCOG, Oakland County, the Alliance of Rouge Communities, and others as deemed appropriate. Employee training components for the City of Bloomfield Hills DPW staff includes:

Employees Trained	Training Description and Frequency
New Bloomfield Hills DPW Employees	Upon hire, employees will: <ul style="list-style-type: none"><li>• View the Municipal Storm Water Pollution Prevention Storm Water training video.</li><li>• Read and become familiar with the City of Bloomfield Hills SOPs</li><li>• Participate in a job shadow program where new staff is paired with a DPW foreman or grounds crewman.</li></ul>
All Bloomfield Hills Facilities Employees	<ul style="list-style-type: none"><li>• View the Municipal Storm Water Pollution Prevention Storm Water training video.</li><li>• Review proper materials storage and handling.</li><li>• Review good housekeeping and pollution prevention practices.</li><li>• Review samples of illicit discharges to the storm sewer system</li><li>• Review City of Bloomfield Hills Spill Response Procedures.</li></ul>
Key Staff	<ul style="list-style-type: none"><li>• Attendance at key staff to relevant training workshops by the Alliance of Rouge Communities, SEMCOG, or others, when available.</li></ul>

## **SECTION N –CONTRACT REQUIREMENTS AND OVERSIGHT**

The contractors hired by the City to perform municipal operations that potentially impact stormwater are required to follow appropriate pollution prevention BMPs indicated in the City's contract language. In cases where an outside contractor is hired to perform services that could impact stormwater, the contracting company will be required to follow appropriate pollution prevention BMPs. All work performed by outside contractors are monitored by City staff through daily observation to ensure quality of work, adherence to the specified contract language, and to ensure that potential impacts to stormwater are minimized.

*Measureable Goals* – To demonstrate the effectiveness of this procedure, the following metrics will be tracked for reporting purposes.

- Number of stormwater pollution related incidents pertaining to activities or work performed by the contractor.
- Number of incidents where the City required corrective action by the contractor

These metrics will be tracked over the reporting cycle that is specified in the City's Certificate of Coverage.

## **SECTION O – COMPLAINT PROCEDURE**

Complaints received by the public are logged into the City's computer system and then routed to the appropriate department for follow up. Investigation into complaints routed to the DPW department is conducted within 48 hours after the complaint has been received by the City. At that time, the DPW will make a determination to correct any problems, or contact the responsible parties for appropriate action.

*Measureable Goals* – To demonstrate the effectiveness of this procedure, the following metrics will be tracked for reporting purposes.

- Number of complaints routed to the DPW department for follow up.
- Number of incidents that prompted additional corrective actions by the DPW or other responsible party

These metrics will be tracked over the reporting cycle that is specified in the City's Certificate of Coverage.

## **SECTION P – PROCESS FOR REVISION**

This procedure shall be reviewed once per permit cycle by the Stormwater Manager for any updates to streamline the requirements.

# STANDARD OPERATING PROCEDURE POLLUTION PREVENTION AND GOOD HOUSEKEEPING

## STREET MAINTENANCE AND WINTER OPERATIONS

THE CITY OF BLOOMFIELD HILLS  
45 E. LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN 48304



MARCH 2016

## **SECTION A – PURPOSE**

The Michigan Department of Environmental Quality (MDEQ) National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase II Stormwater Discharge Permit Application requires a description of operation and maintenance activities to meet the minimum control measure requirements for the Pollution Prevention and Good Housekeeping Program to the maximum extent practicable to prevent or reduce the discharge of pollutants from municipal facilities and operations.

## **SECTION B –INVENTORY AND DESCRIPTION OF MATERIALS AND ACTIVITIES**

The City salt dome, brine tank, and materials stockpiles are located at the Cranbrook Educational Community Salt Dome Area located at 19 Valley Way. The Pollution Prevention and Good Housekeeping activities that occur at this facility are located in the Cranbrook Education Community Pollution Incident Prevention Plan (PIPP). The municipal street maintenance and winter operations activities that occur at the facility include the following:

- 1,550 gallon Double-Walled Brine Tank for deicing procedures
- Materials Stockpiles for road maintenance activities
- Salt Storage Structure for deicing procedures

## **SECTION C – WINTER OPERATIONS**

The City DPW field staff applies rock salt and brine as part of their deicing procedures during the winter months. Bulk storage of road salt and brine is located at the Cranbrook Educational Community Salt Dome Area.

### **C.1 Salt Storage and Loading**

The City of Bloomfield Hills has a salt storage structure consisting of a dome. The floor of the structure is comprised of an impervious cement pad. The structure is not located within 50 feet of a lake shore, stream bank, or wetland, nor is it located in a 100-year floodplain.

Loading of salt takes place at the structure entrance on a paved surface. This procedure is followed as there is not enough room to have both a loader and a truck inside the structure at the same time. The loading area is maintained after each use, with excess salt being swept back inside the storage facility. There are no catch basins in the immediate vicinity of the salt storage structure.

### **C.1 Brine Storage and Loading**

The City of Bloomfield Hills has a 1,550 gallon double-walled brine storage tank that is located on an impervious cement pad outside of the salt dome. The double-walled tank has a level gauge to prevent overfilling and spills and a leak detector between the double walls. There are no catch basins or drainage outlets in the immediate vicinity of the brine tank.

Salt and brine storage and application training is performed to DPW staff. Staff has been trained to minimize any track-out from loading operations. Salt application vehicles are calibrated before the winter season.

## **SECTION D – ROAD, PARKING LOT AND RIGHT-OF-WAY MAINTENANCE**

Road and parking lot maintenance activities includes pothole repair, curb and gutter repair, and gravel road maintenance. These services are addressed by DPW field staff as determined in the field on an as needed basis. Materials are purchased in quantities as needed to reduce waste. Left over materials are stored in designated stockpile areas at the Cranbrook Education Community Salt Dome Area. In cases where a contractor is retained to perform these activities, a City representative is on site to oversee the work and ensure that left over material, concrete washout, and other associated pollutants are disposed of properly. Disposing of concrete washout and other excess repair materials into the storm sewer is strictly prohibited by the City.

### **D.1 Stockpiled Materials**

The stockpile area is located at the Cranbrook Education Community just northwest of the salt dome. Materials are stockpiled at this location and include topsoil, sand, cold patch, and gravel/stone as needed. The stockpile area has a perimeter control in place to prevent erosion which is comprised of a hill one side and precast concrete blocks on two other sides of the stockpile area. The front is left open to provide access for loading.

### **D.2 Unpaved Road Maintenance**

Exposed soil areas are stabilized to prevent soil from eroding during rain events. This is particularly important on steep slopes. Dust suppressants are used to minimize airborne transfer of fine aggregates into the air. Quality aggregates are used to minimize transfer of fine aggregates onto paved surfaces.

### **D.3 Right-of-Way Maintenance**

Grass shoulders are mowed and maintained by the City DPW. No fertilizers, pesticides or herbicides are used on any City properties or road right-of-ways.

### **D.4 Bridge Maintenance**

Bridge and culvert crossings are inspected biennially by an Engineering Consultant.

## **SECTION F – PROCESS FOR REVISION**

This procedure shall be reviewed once per permit cycle by the Stormwater Manager for any updates to streamline the requirements.

# STANDARD OPERATING PROCEDURE POLLUTION PREVENTION AND GOOD HOUSEKEEPING

## SPILL RESPONSE

THE CITY OF BLOOMFIELD HILLS  
45 E. LONG LAKE ROAD, BLOOMFIELD HILLS, MICHIGAN 48304



REVISED AUGUST 2018

## SECTION A – PERSONNEL

The following City personnel have been identified as key staff on charge of spill response planning, implementation and maintenance of the Spill Response Plan.

Name	Phone
Bloomfield Hills Public Safety Dispatch	(248) 644-4200
Chief David Hendrickson – Director of Public Safety	(248) 530-1424
Jamie Spivy – DPW Foreman	(248) 203-0621
Jay Cravens – City Manager	(248) 530-1404

### A.1 Responsibilities

- The **Facility Responsible Person** has primary responsibility for coordinating the response to emergencies, including chemical spills
- **Supervisors** should ensure that employees are familiar with these procedures and receive the necessary training
- **All employees** should follow these procedures in the event of a chemical spill

### A.2 Emergency Contact Numbers

The following telephone numbers should be posted near telephones and in other conspicuous locations:

Name	Affiliation	Phone
Bloomfield Hills Public Safety Dispatch	Bloomfield Hills Public Safety	(248) 644-4200
Chief David Hendrickson	Bloomfield Hills Public Safety	(248) 530-1424
Jamie Spivy – DPW Foreman	Bloomfield Hills DPW	(248) 203-0621
Jay Cravens – City Manager	Bloomfield Hills City Hall	(248) 530-1404
MDEQ 24-Hour Pollution Emergency Alerting System (PEAS)		1-800-292-4706
MDEQ Southeast Michigan District Office		(586) 753-3700
City of Detroit Wastewater Treatment Plant		(313) 297-9400
National Response Center		1-800-424-8802

## SECTION B – CLEAN-UP PROCEDURES

Spilled chemical should be effectively and quickly contained and cleaned up. Employees should clean up spills themselves **only if properly trained and protected**. Employees who are not trained in spill cleanup procedures should report the spill to the Responsible Person(s) listed above, warn other employees, and leave the area.

The following general guidelines should be followed for evacuation, spill control, notification of proper authorities, and general emergency procedures in the event of a chemical incident in which there is potential for a significant release of hazardous materials.

### B.1 Evacuation

Persons in the immediate vicinity of a spill should *immediately evacuate* the premises (except for employees with training in spill response in circumstances described below). If the spill is of “medium” or “large” size, or if the spill seems hazardous, immediately notify emergency response personnel.

### B.2 Spill Control Techniques

Once a spill has occurred, the employee needs to decide whether the spill is small enough to handle without outside assistance. Only employees with training in spill response should attempt to contain or clean up a spill.

NOTE: If you are cleaning up a spill yourself, make sure you are aware of the hazards associated with the materials spilled, have adequate ventilation, and proper personal protective equipment. Treat all residual chemical and cleanup materials as hazardous waste.

Spill control equipment should be located wherever significant quantities of hazardous materials are received or stored. Material Safety Data Sheets (MSDSs), absorbents, over-pack containers, container patch kits, spill dams, shovels, floor dry, acid/base neutralizers, and “caution-keep out” signs are common spill response items.

### B.3 Spill Response and Clean-up

Chemical spills are divided into three categories: Small, Medium and Large. Response and cleanup procedures vary depending on the size of the spill.

**Small Spills:** Any spill where the major dimension is less than 18 inches in diameter. Small spills are generally handled by internal personnel and usually do not require an emergency response by police or fire department HAZMAT teams.

- Quickly control the spill by stopping or securing the spill source. This could be as simple as up-righting a container and using floor-dry or absorbent pads to soak up spilled material. Wear gloves and protective clothing, if necessary.
- Put spill material and absorbents in secure containers if any are available.

- Consult with the Facility Responsible Person and the MSDS for spill and waste disposal procedures.
- Use Dry Cleanup Methods and **never** wash spills down the drain, onto a storm drain or onto the driveway or parking lot.
- Both the spilled material and the absorbent may be considered hazardous waste and must be disposed of in compliance with state and federal environmental regulations.

**Medium Spills:** Spills where the major dimension exceeds 18 inches, but is less than 6 feet. Outside emergency response personnel (police and fire department HAZMAT teams) may be called for medium spills. Common sense, however, will dictate when it is necessary to call them.

- Immediately try to help contain the spill at its source by simple measures only. This means quickly up-righting a container, or putting a lid on a container, if possible. Do not use absorbents unless they are immediately available. Once you have made a quick attempt to contain the spill, or once you have quickly determined you cannot take any brief containment measures, leave the area and alert Emergency Responders at 911. Closing doors behind you while leaving helps contain fumes from spills. Give police accurate information as to the location, chemical, and estimated amount of the spill.
- Evaluate the area outside the spill. Engines and electrical equipment near the spill area must be turned off. This eliminates various sources of ignition in the area. Advise Emergency Responders on how to turn off engines or electrical sources. Do not go back into the spill area once you have left. Help emergency responders by trying to determine how to shut off heating, air conditioning equipment, or air circulating equipment, if necessary.
- If emergency responders evacuate the spill area, follow their instructions in leaving the area.
- After emergency responders have contained the spill, be prepared to assist them with any other information that may be necessary, such as MSDSs and questions about the facility. Emergency responders or trained personnel with proper personal protective equipment will then clean up the spill residue. Do not re-enter the area until the responder in charge gives the all clear. Be prepared to assist these persons from outside the spill area with MSDSs, absorbents, and containers.

- Reports must be filed with proper authorities. It is the responsibility of the spiller to inform both his/her supervisor and the emergency responders as to what caused the spill. The response for large spills is similar to the procedures for medium spills, except that the exposure danger is greater.

**Large Spills:** Any spill involving flammable liquid where the major dimension exceeds 6 feet in diameter; and any “running” spill, where the source of the spill has not been contained or flow has not been stopped.

- Leave the area and notify Emergency Responders (911). Give the operator the spill location, chemical spilled, and approximate amount.
- From a safe area, attempt to get MSDS information for the spilled chemical for the emergency responders to use. Also, be prepared to advise responders as to any ignition sources, engines, electrical power, or air conditioning/ventilation systems that may need to be shut off. Advise responders of any absorbents, containers, or spill control equipment that may be available. This may need to be done from a remote area, because an evacuation that would place the spiller far from the scene may be needed. Use radio or phone to assist from a distance, if necessary.
- Only emergency response personnel, in accordance with their own established procedures, should handle spills greater than 6 feet in any dimension or that are continuous. Remember, once the emergency responders or HAZMAT team is on the job cleaning up spills or putting out fires, the area is under their control and no one may re-enter the area until the responder in charge gives the all clear.
- Provide information for reports to supervisors and responders, just as in medium spills.

## **SECTION C – REPORTING SPILLS**

All chemical spills, regardless of size, should be reported as soon as possible to the Facility Responsible Person. The Responsible Person will determine whether the spill has the potential to affect the environment outside of the facility and must be reported to local, state, or federal agencies. Examples of spills that could affect the outside environment include spills that are accompanied by fire or explosion and spills that could reach nearby water bodies.

### **C.1 Reporting Thresholds**

The spill coordinator will report spills to MDEQ PEAS for spilled that involve the following:

- Salt spills over 50 pounds or 50 gallons of brine onto the ground or into water) (required by Part 5 rules)
- Gasoline release of 32 gallons or more onto the ground (required by Part 201)
- Oil release of 50 pounds (approximately 7½ gallons) onto the ground (required by Part 5 rules)
- Any amount of oil or fuel that reaches surface water or shorelines, call MDEQ PEAS and the National Response Center (as required by the Clean Water Act and Part 31)
- Any spill that is in doubt about reporting

## **C.2 Reporting Requirements**

Within ten (10) days of release, submit a written report for the reportable releases to the following:

- MDEQ Water Resources Division Field Operations Chief, PO Box 30273, Lansing, Michigan 48909-7773
- Oakland County Health Division, 1200 N. Telegraph Road, Building 34 East, Pontiac, Michigan 48341

Note: the optional report form EPQ 3465 can be found at:

[http://www.michigan.gov/deq/0,4561,7-135-3307\\_29894\\_5959-20341--,00.html](http://www.michigan.gov/deq/0,4561,7-135-3307_29894_5959-20341--,00.html)

The MDEQ may request other follow-up reports depending on the situation.

## **SECTION D – SPILL KIT INVENTORY**

The following is a list of spill response equipment that will be maintained by the designated spill response coordinators at all locations where fuel products are stored and dispensed.

### **D.1 Minimum Spill Response Equipment**

- 20 pounds of floor dry
- 1 shovel
- 1 broom
- Caution tape
- 2 Absorbent booms
- 20 Absorbant Pads
- Container for clean-up (30 gallons)
- Sample bottles

## **SECTION E – PROCESS FOR REVISION**

This procedure shall be reviewed once per permit cycle by the Stormwater Manager for any updates to streamline the requirements.

**APPENDIX I**  
**Total Maximum Daily Loads (TMDL)**  
Click [here](#) for link to Collaborative TMDL