ADMINISTRATIVE GUIDELINES FOR STORM WATER MANAGEMENT

REQUIREMENTS AND GENERAL COMPLIANCE GUIDELINES
FOR STORM WATER DRAINAGE SYSTEM DESIGN
FOR DEVELOPMENT AND REDEVELOPMENT
WITHIN GLADWIN COUNTY

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TABLE OF CONTENTS

I. INTRODUCTION *3*

II. ADMINISTRATIVE GUIDELINES *4*

A. Definitions 4

B. Permit Application Requirements and Review Procedure 8

C. Inspection Requirements 12

D. Fee Schedule 13

III. STORM DRAINAGE SYSTEMS WITHIN GLADWIN COUNTY *14*

A. Areas Only Under Jurisdiction of Gladwin County 14

IV. DESIGN REQUIREMENTS AND ENGINEERING CALCULATIONS *14*

A. Allowable Discharge Rate (Qa10) and 25-Year Design Discharge (Qd25) 14

B. Storm Water Detention Requirements 15

C. Discharge Restrictor Requirements 15

V. MINIMUM DESIGN REQUIREMENTS AND GUIDELINES FOR STORM DRAINAGE SYSTEMS *15*

A. Requirements 15

B. General Compliance Guidelines 19

C. Variations from Requirements 19

APPENDIX *21*

STORM WATER DETENTION REQUIREMENTS

DRAINAGE PLAN CHECKLIST

DAILY INSPECTION REPORT

DETENTION AND RESTRICTION, FINAL INSPECTION REPORT FORM

GLADWIN COUNTY ROAD COMMISSION APPLICATION AND PERMIT

MAINTENANCE AGREEMENT

DETENTION CALCULATION WORKSHEET

I. INTRODUCTION

The purpose of the Administrative Guidelines is to establish requirements and general compliance guidelines for storm water management practices in Gladwin County. The Guidelines establish the framework through which detention and/or retention measures will be implemented and details the process that must be followed to gain approval for new developments or redevelopment drainage systems. The purpose of the administrative guidelines is to accomplish, among others, the following objectives:

1. To reduce artificially induced flood damage;

2. To minimize increased storm water runoff rates and volumes from identified new land development;

3. To minimize the deterioration of existing watercourses, culverts and bridges, and other structures;

4. To encourage water recharge into the ground where geologically favorable conditions exist;

5. To prevent an increase in non-point source pollution;

6. To maintain the integrity of stream channels for their biological functions, as well as for drainage and other purposes;

7. To minimize the impact of development upon stream bank and streambed stability and maintain a more normal stream response during precipitation events;

8. To reduce erosion from development or construction projects;

9. To preserve and protect water supply facilities and water resources by means of controlling increased flood discharges, stream erosion, and runoff pollution;

10. To reduce storm water runoff rates and volumes, soil erosion, and non-point source pollution, wherever practicable, from lands that were developed without storm water management controls meeting the purposes and standards of this ordinance; and,

11. To reduce the adverse impact of changing land use on water bodies and, to that end, the Storm Water Ordinance establishes minimum standards to protect water bodies from degradation resulting from changing land use where there are insufficient storm water management controls.

This Document includes:

1. A summary of the procedures to be followed under the administrative guidelines, including requirements, review procedures, inspection requirements, fee schedule and other agency requirements.

2. A description of design requirements and engineering calculations.

3. A description of minimum design criteria and rules to be followed for design of new drainage systems within Gladwin County.

II. ADMINISTRATIVE GUIDELINES

A. Definitions

1. *Allowable Discharge*: The restricted discharge from a site after development or redevelopment as calculated in accordance with this Storm Water Management Plan.

2. *Base Flood:* The flood having a one (1) percent chance of being equaled or exceeded in any given year.

3. *Base Flood Elevation*: The elevation delineating the flood level having a one-percent probability of being equaled or exceeded in any given year (also known as the 100-year flood elevation), as determined from Flood Insurance Rate Maps (FIRMs) or the best available information.

4. *Base Flood Plain:* The area inundated by the Base Flood.

5. *Best Management Practices (BMPs):* A practice, or combination of practices and design criteria that comply with the Michigan Department of Environmental Quality's Guidebook of BMPs for Michigan Watersheds, or equivalent practices and design criteria that accomplish the purpose of the Ordinance (including, but not limited to minimizing storm water runoff and preventing the discharge of pollutants into storm water) as determined by the Drain Commissioner and/or designee, and where appropriate, the standards of the Gladwin County Drain Commissioner.

6. *Building Opening:* Any opening of a solid wall such as a window or door, through which floodwaters could penetrate.

7. *Clean Water Act:* The Federal Water Pollution Control Act, 33 USC Sec 1251 et seq., as amended, and the applicable regulations promulgated thereunder.

8. *Conduit*: Any channel, pipe, sewer or culvert used for the conveyance or movement of water whether open or closed.

9. *Construction Site Storm Water Runoff*: Storm water runoff from a development site following an earth change.

10. *Control Elevation*: Contour lines and points of predetermined elevation used to denote a detention storm area on a plat or site drawing.

11. *Designee*: The engineering firm formally designated by Gladwin County to act as their Engineer.

12. *Design Engineer:* Registered and licensed professional engineer responsible for the design of a drainage plan.

13. *Detention:* A system that is designed to capture storm water and release it over a given period of time through an outlet structure at a controlled rate.

14. *Detention Facility*: A facility constructed or modified to restrict the flow of storm water to a prescribed maximum rate and to concurrently detain the excess waters that accumulate behind the outlet.

15. *Detention Storage*: The temporary detaining or storage of storm water in storage basin, on rooftops, in streets, parking lots, school yards, parks, open space, or other areas under predetermined and controlled conditions, with the rate of drainage regulated by appropriately installed devices.

16. *Developed or Development*: The installation or construction of impervious surfaces on a development site that require, pursuant to state law or local ordinance, the **County**'s approval of a site plan, plat, site condominium, condominiums, trail parks, special land use, planned unit development, rezoning of land, land division approval, private road approval or other approvals required for the development of land or the erection of buildings or structures; provided, however, **developed or development shall not include the actual construction of, or an addition, extension or modification to, an individual single-family or a two-family detached dwelling**.

17. *Developer:* Any person proposing or implementing the development of land.

18. *Developer/Owner Engineer*: The engineering company formally designated by the Developer/Owner to act as their Engineer.

19. *Development Site:* Any land that is being or has been developed, or that a developer proposes for development.

20. *Discharge*: The release or outflow of water from any source.

21. *Discharger:* Any person or entity that directly or indirectly discharges storm water from any property. Discharger also means any employee, officer, director, partner, contractor, or other person who participates in, or is legally or factually responsible for, any act or omission, which is or results in a violation of the storm water ordinance.

22. *Drain:* Any drain as defined in the Drain Code of 1956, as amended, being MCL 280.1, etc. seq., other than an established county or intercounty drain.

23. *Drainage:* The collection, conveyance, or discharge or ground water and/or surface water.

24. *Drainage Area*: The area from which storm water runoff is conveyed to a single outlet (i.e. a watershed or catchment area).

25. *Drainageway:* The area within which surface water or ground water is carried from one part of a lot or parcel to another part of the lot or parcel or to adjacent land.

26. *Earth Change:* Any human activity, which removes ground cover, changes the slope or contours of the land, or exposes the soil surface to the actions of wind and rain. Earth change includes, but is not limited to, any excavating, surface grading, filling, landscaping, or removal of vegetative roots.

27. *EPA:* The United States Environmental Protection Agency.

28. *Erosion:* The process by which the ground surface is worn away by action of wind, water, gravity or a combination thereof.

29. *Excess Storm Water Runoff*: The volume and rate of flow of storm water discharged from a drainage area, which is in excess of the allowable discharge.

30. *Exempted Discharges*: Discharges other than storm water, as described in MIG619000.

31. *Federal Emergency Management Agency (FEMA):* The agency of the federal government charged with emergency management.

32. *Flood or Flooding:* A general and temporary condition of partial or complete inundation of normally dry land areas resulting from the overflow of water bodies or the unusual and rapid accumulation of surface water runoff from any source.

33. *Floodplain*: The special flood hazard lands adjoining a watercourse, the surface elevation of which is lower than the Base Flood Elevation and is subject to periodic inundation.

34. *Flood Proofing:* Any structural and/or non-structural additions, changes, or adjustments to structures or property that reduce or eliminate flood damage to land, or improvements utilities and structures.

35. *Flood Protection Elevation (FPE)*: The Base Flood Elevation plus 1 foot at any given location.

36. *Floodway*: The channel of any watercourse and the adjacent land areas that must be reserved to carry and discharge a base flood without cumulatively increasing the water surface elevation more than one-tenth (1/10) of a foot due to the loss of flood conveyance or storage.

37. *GCDC*: Gladwin County Drain Commissioner.

38. *Grading*: Any stripping, excavating, filling, and stockpiling of soil or any combination thereof and the land in its excavated or filled condition.

39. *Illicit Connection*: Any method or means for conveying an illicit discharge into water bodies or the County's storm water system.

40. *Illicit Discharge*: Any discharge to water bodies that does not consist entirely of storm water, discharges pursuant to the terms of an NPDES permit, or exempted discharges as defined in the Storm Water Ordinance.

41. *Impervious Surface*: Surface that does not allow storm water runoff to slowly percolate into the ground.

42. *Lowest Floor*: The lowest floor or the lowest enclosed area (including a basement), but not including an unfinished or flood-resistant enclosure, which is usable solely for parking of vehicles or building access.

43. *MDEQ*: Michigan Department of Environmental Quality.

44. *NPDES*: National Pollutant Discharge Elimination System.

45. *Overland flow-way*: Surface area that conveys a concentrated flow of storm water runoff.

46. *Peak Flow*: The maximum rate of flow of storm water runoff at a given location.

47. *Person*: An individual, firm, partnership, association, public or private corporation, public agency, instrumentality, or any other legal entity.

48. *Plan*: Written narratives, specifications, drawings, sketches, written standards, operating procedures, or any combination of these, which contain information pursuant to the Storm Water Ordinance.

49. *Pollutant*: A substance discharged which includes, but is not limited to the following: any dredged spoil, solid waste, vehicle fluids, yard wastes, animal wastes, agricultural waste products, sediment, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological wastes, radioactive materials, heat, wrecked or discharged equipment, wastes, radioactive materials, heat, wrecked or discharged equipment, rock, sand, cellar dirt, and industrial, municipal, commercial and agricultural waste, or any other contaminant or other substance defined as a pollutant under the Clean Water Act.

50. *Property Owner*: Any person having legal or equitable title to property or any person having or exercising care, custody, or control over any property.

51. *Redevelopment*: Altering, improving, or otherwise changing the use of an existing developed property. A site will be considered a redevelopment for this Storm Water Management Plan when an area greater than or equal to 5% of the existing developed site or an area greater than 500 square feet is increased with additional roof, pavement, or any other impervious surface.

52. *Retention*: A system that is designed to capture storm water and contain it until it infiltrates the soil or evaporates.

53. *Soil Erosion*: The stripping of soil and weathered rock from land creating sediment for transportation by water, wind or ice, and enabling formation of new sedimentary deposits.

54. *State of Michigan Water Quality Standards*: All applicable State rules, regulations, and laws pertaining to water quality, including the provisions of Section 3106 of Part 31 of 1994 PA 451, as amended.

55. *Storm Drain*: A system of open or enclosed conduits and appurtenant structures intended to convey or manage storm water runoff, ground water and drainage.

56. *Storm Water Permit*: A permit issued pursuant to the Storm Water Ordinance.

57. *Storm Water Runoff*: The water from a rain storm, snow melt or other natural event or process, which flows over the surface of the ground or is collected in a drainage system.

58. *Storm Water Runoff Facility*: The method, structure, area, system, or other equipment of measures which are designed to receive, control, store, or convey storm water.

59. *Stream*: A river, stream or creek which may or may not be serving as a drain, or any other water body that has definite banks, a bed, and visible evidence of a continued flow or continued occurrence of water.

60. *Time of Concentration*: The elapsed time for storm water runoff to flow from the most distant point in a drainage area to the outlet or other predetermined point.

61. *Twenty-five (25) year Design Storm*: A precipitation event with a duration equal to the time of concentration, having a four percent chance of occurring in any one year.

62. *Upland Area*: Land located in the upper portion of a watershed whose surface drainage flows toward the area being considered for development.

63. *Urbanization*: The development, change, or improvement of any parcel of land consisting of one or more lots for residential, commercial, industrial, institutional, recreational, or public utility purposes.

64. *Water Body*: A river, lake, stream, creek or other watercourse or wetlands.

65. *Watercourse*: Any natural or artificial stream, river, creek, channel, ditch, canal, conduit, culvert, drain, waterway, gully, ravine, street, roadway, swale, or wash in which water flows in a definite direction, either continuously or intermittently.

66. *Watershed*: A region draining into a water body.

67. *Wetlands*: Land characterized by the presence of water at a frequency and duration sufficient to support wetland vegetation or aquatic life.

B. Permit Application Requirements and Review Procedure

1. Conceptual Review Prior to Permit Application

   a. Contact the Drain Commissioner's Office and/or Gladwin County web site (www.gladwinco.com) to obtain the latest version of the Administrative Guidelines.

   b. Prior to the permit application, the Owner/Developer shall submit to the Drain Commissioner or his designee the conceptual design and layout of the proposed development. The Developer/Owner shall also submit copies of the conceptual design and layout to the Township where the development is proposed for preliminary review and comment. This conceptual design and layout, at a minimum, shall include:

      i. Small location map showing the section and part of the section in which the site is situated;
      ii. Location and description of all activities that may impact or be impacted by the proposed development or redevelopment both on and off the site;
      iii. Acreage of the total site and acreage of the area being effected by the development; and
      iv. If known, a conceptual layout of the proposed drainage system for the development or redevelopment.

c. The Owner/Developer or the Design Engineer shall submit information including a description of the drainage district/watershed, allowable discharge, impervious factor, etc. with the conceptual design and layout of the proposed development.

d. The Drain Commissioner or his designee and/or the township or municipality where the development is located will review the conceptual design information to determine if it is consistent with these Guidelines.

e. The Owner/Developer and the Design Engineer must meet with the Drain Commissioner and/or his/her designee, the Gladwin County Road Commission and the Township or municipality where the project is proposed. The intention of these meetings is to obtain uniform direction and communication to minimize misdirection of early construction and minimize financial losses to proprietors, developers, and consultants. The applicable utility companies will also be invited to this meeting.

f. If the conceptual layout of the storm drainage system is approved, the Owner/Developer shall begin completing final design plans and calculations for application submittal under these Guidelines.

2. Permit Application Submittal

Permit applications shall be submitted to the Drain Commissioner by the Owner/Developer or the Design Engineer on behalf of the Owner/Developer. Application for a permit shall be made prior to the start of any work on the proposed development requiring a permit under these Guidelines. Soil test borings, vegetative cutting solely for land surveys, percolation tests, and normal maintenance shall not be considered a start of work under these Guidelines.

3. Sequential Applications

For projects on a site which are so large or complex that a plan encompassing all phases of the project cannot reasonably be prepared prior to initial work, application for permit on successive major construction activities may be allowed. Requests for sequential applications shall be approved by the Drain Commissioner prior to submittal of the initial permit application.

4. Application Submittal Requirements

a. The Owner/Developer or Design Engineer shall submit four sets of plans, four sets of calculations, and any other supporting information for the site to the Drain Commissioner or his designee with the application. The plans and calculations shall comply with the requirements of these Guidelines. The checklist, design requirements, and design guidelines that will be used during the review process of the drainage construction plans are established by these Guidelines. The application submittal shall include:

i. The location of the development site and water bodies that will receive storm water runoff;
ii. The existing and proposed topography of the development site, including the alignment and boundary of the natural drainage courses, with contours having a maximum interval of 1 foot (using USGS datum). The information shall be superimposed on the pertinent Gladwin County soil map;
iii. The development tributary area to each point of discharge from the development;

iv. Calculations for the final peak discharge rates;
v. Calculations for any facility or structures size and configuration;
vi. A drawing showing all proposed storm water runoff facilities with existing and final grades;
vii. The sizes and locations of upstream and downstream culverts serving the major drainage routes flowing into and out of the development site. Any significant off-site and on-site drainage outlet restrictions other than culverts should be noted on the drainage map;
viii. An implementation plan for construction and inspection of all storm water runoff facilities necessary to the overall drainage plan, including a schedule of the estimated dates of completing construction of the storm water runoff facilities shown on the plan and an identification of the proposed inspection procedures to ensure that the storm water runoff facilities are constructed in accordance with the approved drainage plan;
ix. A plan to ensure the effective control of construction site storm water runoff and sediment track-out onto roadways;
x. Drawings, profiles, and specifications for the construction of the storm water runoff facilities reasonably necessary to ensure that storm water runoff will be drained, stored, or otherwise controlled in accordance with these Guidelines.
xi. The name of the engineering firm and the Design Engineer that will inspect final construction of the storm water runoff facilities;
xii. Deposit/fee (non-refundable) for plan review and inspection in accordance with the fee schedule provided herein; and
xiii. Any other information necessary for the Drain Commissioner or their designee to verify that the drainage plan complies with these Guidelines. All design information must be compatible for conversion to the Gladwin County Geographic Information System.

b. A maintenance agreement, in form and substance acceptable to the Drain Commissioner, shall be required for ensuring maintenance of any privately owned storm water runoff facilities. The maintenance agreement shall include the owner/developer's written commitment to provide routine, emergency, and long-term maintenance of the facilities and, in the event that the facilities are not maintained in accordance with the approved drainage plan, the agreement shall authorize the Drain Commissioner to maintain any on-site storm water runoff facility as reasonably necessary, at the developer's/owner's expense.

5. Permit Application Review

The Drain Commissioner or their designee will review all plans, calculations, and other information for compliance with these Guidelines. All materials will be reviewed for completeness. Calculations will be checked. The minimum design requirements and guidelines as outlined in these Guidelines will be used as a reference. The drainage plan checklist will be reviewed. The Drain Commissioner shall approve, approve with conditions, or disapprove an application within 28 days. The review period begins upon the receipt of a completed application, plan and fees. Copies of the approval, approval with conditions, or disapproval will be provided to the Township or municipality where the proposed development is located.

a. Approval or Approval with Conditions. Upon a determination by the Drain Commissioner or their designee that the permit application has met all of the requirements of these Guidelines, the Drain Commissioner will issue a permit specifying the work approved. The Drain Commissioner shall notify the Owner/Developer of the approval or approval with conditions by first class mail or delivery in person along with a set of plans stamped approved.

b. Disapproval. If the proposed drainage system is disapproved, four sets of plans and calculations may be resubmitted with the appropriate revisions.

6. Changes to Plan after Approval

a. Any proposed changes made to the approved plan shall be submitted to the Drain Commissioner and/or their designee for review and approval.

b. Upon receipt of this information, the Drain Commissioner will be determined whether additional information, such as calculations, will be required or whether modifications to the permit will be necessary.

7. Permit Expiration

Permits shall expire automatically upon the project completion date provided on the permit. Permits shall also terminate automatically if construction has not commenced within one year of the date of issuance. The Drain Commissioner may extend a permit for a period not to exceed one year upon the request of the Owner/Developer if there are valid reasons to support such an extension.

8. Permit Revocation

Any permit issued by the Drain Commissioner under these Guidelines may be revoked or suspended 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 submittal. The Drain Commissioner will provide the Owner/Developer notice of any revocation of the permit in writing by certified mail.

9. Permits and Approvals by Other Governmental Agencies

Approvals under these Guidelines shall not relieve Owner/Developer of the need to obtain other applicable permits or approvals as required by federal, state, county and local agencies. Examples of other permits or approvals, which may be required, include:

- Gladwin County Road Commission, which has or shares jurisdiction over drainage along county roads and county rights-of-way within Gladwin County. Sites located along county road rights-of-way and discharging to Road Commission drainage systems must obtain a permit from the Road Commission. When a crossing is installed over a county roadside drain, a permit must be obtained from the Road Commission. An application is included in Appendix B.

- Michigan Department of Transportation (MDOT), which has or shares jurisdiction over drainage along state highways and state rights-of-way within Gladwin County. Sites located along MDOT rights-of-way and discharging to MDOT drainage systems must obtain a permit from MDOT.

- Soil Erosion and Sedimentation Control. The Gladwin County Construction Code Office is the County Enforcing Agent for Gladwin County, and a permit must be obtained when applicable.

- Michigan Department of Environmental Quality (MDEQ), which has jurisdiction over, proposed work within the 100-year floodplain, inland lake and stream areas, and wetland areas. A permit must be obtained for work proposed in these areas. In addition, the MDEQ is responsible for implementing the National Pollution Discharge Elimination System (NPDES) Storm Water Permitting Program.

C. Inspection Requirements

Inspection of storm sewer systems and/or detention facilities is required on all development and redevelopment projects. The extent of the inspection is dependent on the size and type of the development or redevelopment as outlined below. As-built drawings will be required on all projects prior to final inspection. Descriptions of the inspection requirements are outlined below. The fees associated with this inspection are outlined in Section II.D. It is not the intent of these Guidelines to review single-family residential development.

1. *Commercial Developments* - A final inspection of the restrictor and the detention storage areas by the Drain Commissioner and/or designee will be required. This one-time inspection will be performed at the completion of construction, after as-built drawings have been received by the County. A final inspection report (Appendix) will be completed by the Drain Commissioner and/or designee. Subsequent inspections may be required if deficiencies exist. Subsequent inspections will be charged hourly at the rate of $75.00 per hour.

   Site inspections of the storm sewer, outlet, and detention storage areas by the Drain Commissioner and/or designee will be required. These inspections will occur during construction as determined necessary by the Drain Commissioner and/or designee. The Owner/Developer and/or the Owner/Developer's Engineer will be informed at what stage of construction these inspections will be required. The Drain Commissioner and/or designee shall be informed 24 hours in advance for these site inspections. Daily inspection reports will be completed as needed. At a minimum, the inspection reports will include the information shown on the sample daily inspection report included in Appendix.

   A final inspection by the Drain Commissioner and/or designee will take place at the completion of the project, after as-built drawings have been received by the County. A final inspection report (Appendix) will be completed by the Drain Commissioner and/or designee.

2. *Residential and Condominium Projects* - Full time inspection of storm sewer and drainage system construction will be required. This inspection shall be performed by the Owner/Developers Engineer or the Drain Commissioner and/or designee. Daily Inspection reports shall be completed for all days on which construction of the storm drainage system occurs. Copies of these reports shall be submitted to the Drain Commissioner and/or designee at the beginning of each week. At a minimum, the daily inspection reports shall include the information shown on the sample daily inspection report included in Appendix.

A final inspection by the Drain Commissioner and/or designee will take place at the completion of the project after as-built drawings have been received by the County. A final inspection report (Appendix) will be completed by the Drain Commissioner and/or designee.

D. Fee Schedule

The fee schedule for reviewing storm drainage submittals and performing inspection of drainage system construction is outlined below:

REVIEW FEES:

Size of Development	Fee
Commercial Developments and Redevelopments	Lump Sum, with a minimum fee of $800 Review + $200 Inspection + $100 Administration Fee = $1,100 Deposit (Total)

*Most site reviews are completed at the minimum review cost. Complex sites that require special easements, agreements, etc. will be charged at an hourly rate. An estimate will be provided upon having the conceptual design review meeting.

Fees: The permit fee is for the first storm water review and inspection of redevelopment site plan submittal. An additional hourly fee will be required for subsequent reviews and inspections.

Deposits: Deposits must be received by the Drain Commissioner prior to the review of the storm drainage plans. Checks shall be made payable to the Gladwin County Drain Commissioner. Deposits are non-refundable.

INSPECTION OF INSTALLATION OF INFRASTRUCTURE (if required)

1. Residential Subdivisions and Condominiums – If the Drain Commissioner will be taking the infrastructure over as an established County Drain, then daily inspection of the installation of the storm sewer and construction of the storm water detention areas will be required. This will be done at the rate of $75/hour.

2. Hourly, specific on the job and the contractor.

The permit fee is for the first storm water review and inspection of a small development or redevelopment site plan submittal. An additional hourly fee will be required for subsequent reviews and inspections.

III. STORM DRAINAGE SYSTEMS WITHIN GLADWIN COUNTY

A. Areas Only Under Jurisdiction of Gladwin County

1. Discussion

   Several areas within Gladwin County are not incorporated into established county drainage districts. The storm water flows in these areas are regulated by the Michigan Department of Environmental Quality, Michigan Department of Transportation, or the Gladwin County Road Commission. (See section B.9. – Permits and Approvals by Other Governmental Agencies.)

2. Allowable Discharge (Qa)/ Detention Requirements

   The peak storm water discharge from any proposed development or redevelopment as required in these Guidelines shall be restricted to an allowable discharge (Qa). The allowable discharge from the proposed area of development or redevelopment cannot exceed the calculated discharge from the proposed site based on one of the following methods. The method resulting in the lowest allowable discharge from the site shall be used in determining the required detention.

   a. 0.15 cubic feet per second per acre of contributing area. (i.e. 0.15 cfs/acre*10 acre site = 1.5 cfs Qa)

   b. The percentage of capacity available in the downstream receiving storm sewer and/or watercourse. (i.e. capacity of outlet storm sewer is 10 cfs, there is a total of 100 acres within the contributing district, the proposed site has 20 acres (20 acres of site/100 acres of contributing watershed * 10 cfs, capacity = Qa of 2 cfs)

   Excess storm water runoff must be detained on site. Equations for determining the required volume of detention storage are outlined in Section IV. Detention storage calculations must be included with review submittals.

IV. DESIGN REQUIREMENTS AND ENGINEERING CALCULATIONS

A. Allowable Discharge Rate (Qa) and 10-Year Design Discharge (Qd10)

The storm water discharge rate from any proposed development or redevelopment site shall be restricted to an allowable discharge (Qa). This allowable discharge shall be the most restrictive discharge (smallest discharge) from the site as determined by one of the following three (3) design approaches. The 10-year design discharge (Qd10) for the proposed site development or redevelopment to be used for storm sewer sizing shall include the discharge from all development upstream of the proposed site fully developed to current zoning requirements.

1. The allowable discharge may need to be restricted further based on the capacity of the downstream storm sewer or drainage system. To minimize impacts downstream, the maximum capacity of the existing storm sewer or drain without surcharging or flooding shall be determined at the controlling downstream restriction. The drainage area contributing at this restriction shall be determined. Based on the area of the proposed development, the area upstream of the restriction, and the outlet capacity at the restriction, an allowable discharge shall be determined by the following method.

Qa = Qr(Ad/Ac)

Qa = Allowable discharge from proposed development or redevelopment.
Qr = Maximum capacity of downstream storm sewer/drain at the controlling restriction.
Ad = Area of the proposed site development or redevelopment.
Ac = Total area of watershed contributing upstream of the restriction.

2. If it is determined that the existing runoff from the drainage district/watershed is at or exceeds the capacity of the downstream storm sewer or drain, the proposed development or redevelopment will at a minimum have to be restricted to pre-development conditions. The allowable discharge from the site shall not exceed the runoff from the site during the 10-year storm event under pre-development conditions. This discharge can be determined using the rational method previously identified and the existing percentage of impervious surface on the site.

3. Increase discharge rate above allowable if Design Engineer can prove no impacts downstream.

B. Storm Water Detention Requirements

The storm water detention storage required for a site is to be calculated using the Gladwin County Drain Commissioner's Excel spreadsheet, which can be obtained at www.gladwinco.com.

C. Discharge Restrictor Requirements

Restrictors are required to regulate the discharge of storm water to the allowable discharge rate established for a site. The circular in-line restrictor is sized based on the orifice formula.

$$a = Qa/[\ 0.62\ (64.4(\ h))^{½}\ ]$$

a = area of orifice (sq. ft.).
Δh = head differential from center of orifice to Hydraulic Grade Line of detention pond at maximum capacity, (ft).

V. MINIMUM DESIGN REQUIREMENTS AND GUIDELINES FOR STORM DRAINAGE SYSTEMS

The following is an outline of requirements for the design of storm water management systems. Engineering judgment must be utilized to accomplish the overall goals of these Guidelines.

A. Requirements

1. General Requirements

   a. Storm water detention requirements for any new construction development, redevelopment, or land use change occurring within Gladwin County will be determined according to the storm water discharge permit procedure.

b. A storm water discharge permit will be required for all site development and demolition except residential sites for single-family or two-family dwellings on any parcel of one acre or less in size. The County may require side lot or rear lot drainage to be installed if the County determines it necessary. This activity will be regulated under the building permit.

c. The peak runoff rate during a 10-year storm event from a developed or improved site shall not exceed the allowable discharge rate (Qa). This rate is determined using the design impervious factor (IF) established by the County for the site. The impervious factor of demolished sites is assumed 0%. Either detention storage with a regulated discharge must be provided or all impervious surfaces must be removed from the site.

d. There shall be no detrimental effect on the floodway or the floodplain elevation during a 25-year design storm upstream or downstream of the proposed development area as a result of the proposed development.

e. The drainage area used for computation will be the total area tributary to the site outlet, including off-site properties that drain onto the site.

f. Engineering calculations must be submitted with the storm water discharge permit application. The calculations shall follow the procedures outlined in this document.

g. Roof drains may be connected to a sewer system if the flow through the outlet to the County system is properly restricted. Unrestricted runoff from roof drain will not be accepted; there are no exemptions.

h. The Drain Commissioner and/or designee shall make a determination as to whether any or all of the facilities proposed are to become private or part of the Gladwin County Drainage system or any other regulating agency.

i. The Drain Commissioner and/or designee shall in the case of a proposed subdivision, make a determination as to those control elevations that shall be entered on the final plat or make a determination as to the necessity for deed restrictions on any particular lot in the subdivision requiring the preservation of mandatory drainage facilities. Where a non-subdivided parcel of land is proposed for development, the Drain Commissioner and/or designee shall make a determination as to the need for covenants to maintain responsibility for mandatory drainage facilities. All the facilities in the subdivision shall be located in easements dedicated to the public, and shall be subject to continual inspection during the construction period.

j. Proposed storm sewer enclosures must be designed so they will not adversely impact any adjacent properties, upstream or downstream, and must be designed to the impervious factors of the lands based upon future land use, not necessarily existing conditions.

k. Soil erosion and sedimentation control measures must be implemented.

2. Storm Sewer Piping Requirements

a. Proposed storm sewer shall be designed to have capacity to pass 10-year design storm runoff rate (Qd).

b. All storm sewer materials must comply with the authority having jurisdiction over the storm sewer system.

c. Provide 2 foot minimum cover with minimum 5 foot cover in M.D.O.T.R.O.W.

d. Provide 18" Vertical separation between all other utilities including, sanitary sewers and water mains.

e. Provide 10 foot Horizontal separation from other utilities.

f. Manhole/catch basin shall be placed at a maximum distance of 350 foot from any other manhole/catch basin for access/maintenance purposes. All inlet structures will state "Dump No Waste – Drains to River".

g. Catch basins in commercial developments (parking lots) will have oil separators and agreement for cleanout.

h. Provide a sump discharge outlet for each individual lot in all developments. This outlet shall be a catch basin (minimum 2 foot diameter).

i. Place a catch basin (minimum 2 foot diameter) between each pair of driveways, if curb and gutter, driveway culverts, and/or valley shaped ditches are not proposed.

j. Minimum pipe grades must be such to produce minimum scouring velocity of 2.5 ft/sec when pipe is flowing full without surcharging.

k. Concrete pipe (C-76-III) should have fabric wrapped joints.

l. For private storm sewer systems plastic pipe may be used. This plastic pipe shall be either schedule 80 PVC, smooth walled HDPE, or SDR 35. If pipe is perforated, a manufacturer's "Sock" shall be used over the pipe.

m. Minimum pipe diameter for catch basin leads is 10".

n. Minimum pipe size for storm sewer main is 12".

o. Pipe should be sized for a 10-year design storm without surcharging when possible.

p. When two pipes or more of different sizes come into a structure, the 8/10th flow lines shall match when possible.

q. Catch basins should have a minimum sump depth of 24".

3. Detention Requirements

a. Proposed storm sewer detention facilities shall be designed to have capacity to detain at minimum the 10-year recurrence interval design storm runoff volume in excess of the allowable discharge from the site. The detention requirement must be discussed with the County Drain Commissioner and/or designee. There are areas within the county that are more restrictive than the 10-year recurrence interval.

b. The maximum design storage elevation in a detention area must be a minimum of 1 foot below the lowest ground elevation adjacent to the detention area.

c. The design maximum storage elevation in a detention area must not exceed a depth of 9" above any paved surfaced.

d. The design maximum storage elevation in a detention area must not be closer than 12" below the minimum finish floor elevation of the proposed structure(s) or existing facilities.

e. Designs of detention facilities will incorporate features that facilitate their inspection and maintenance. The designer shall submit an Operation and Maintenance (O&M) Plan and/or provide maintenance agreement, as necessary, for any detention facility prior to its acceptance by the County.

f. Designs of detention facilities shall incorporate safety features, particularly at inlets, outlets, on steep slopes, and at any attractive nuisances. These features may include, but not be limited to, fencing, handrails, lighting, steps, grills, signs, and other protective or warning devices so as to restrict access. If the Owner/Developer does not implement recommended safety features, liability for the detention facilities will be the responsibility of the Owner/Developer.

g. Side slopes and the bottom of detention basins shall be top soiled, to a minimum of 3", and seeded.

h. The side slopes and bottom of the basins shall be shaped with maximum slopes of 1 vertical to 4 horizontal to allow mowing of these surfaces.

i. Detention basins and restrictors shall be maintained as necessary. If a detention basin is found not to be maintained or a restrictor is removed or not maintained, the owner will have 30 days to complete the necessary maintenance. If this maintenance is not completed, the County will have any necessary maintenance completed at the Owners expense. Unless other arrangements have been agreed to in writing in an executed maintenance agreement.

j. Detention basins shall be constructed with the top of banks a minimum of 5 foot from any pedestrian walkway (i.e. public and private sidewalks/bike paths).

k. Basins constructed for storm water detention are not to be construed as wetlands.

4. <u>Rear Lot Drainage Requirements</u>

a. Rear lot tile drains with contributing drainage areas up to 1/2 acre shall have a minimum diameter of 6 inches and a minimum pipe slope of 0.5%.

b. Rear lot tile drains with contributing drainage areas greater than 1/2 acre and less than 1 acre shall have a minimum diameter of 8" and a minimum pipe slope of 0.3%.

c. Rear lot tile drains with a contributing area greater than 1 acre shall be considered main line storm sewer and shall be designed according to corresponding requirements. Calculations shall be submitted to verify the rear lot drains have the capacity to pass the 10-year design storm event.

d. All lots requiring rear lot drainage shall be adjacent to a rear lot catch basin.

e. Rear lot drainage tiles shall have a minimum cover of 2 foot.

f. Rear lot drainage tile and catch basin material shall be approved by the Drain Commissioner or designee. The minimum diameter of a rear lot catch basin shall be 2 foot.

B. General Compliance Guidelines

The following guidelines are recommended, but are not a requirement of this plan. These guidelines are provided for reference.

1. The minimum surface slopes for overland drainage are as follows:

- For bituminous paved surfaces, 1%.
- For concrete paved surfaces, 0.5%.
- For concrete curb and gutter, 0.28%.
- For drainage swales and valley shaped ditches, 0.5%.
- For rear lot drainage swales and valley shaped ditches, 0.5%.
- Landscape grading, 2%.

2. The maximum surface slopes for overland drainage are as follows:

- For bituminous, concrete paved surfaces, 5%.
- For concrete curb and gutter, 5%.
- For drainage swales and valley shaped ditches, 5%.
- For rear lot drainage swales and valley shaped ditches, 5%.
- Drainage swales and valley shaped ditches shall have maximum side slopes of 3 horizontal to 1 vertical.
- Landscape grading, 4 horizontal to 1 vertical.

C. Variations from Requirements

The Drain Commissioner may issue a storm water discharge permit that waives allowable discharge requirements and/or detention requirements. Variation from these requirements shall require the approval of Gladwin County Drain Commissioner whose actions shall be conditioned upon the following:

1. The Drain Commissioner has determined that the overall storm water management for drainage system is best suited to allow the site to drain unrestricted so that the timing of the discharge will not adversely impact upstream lands.

2. The Owner/Developer shall provide evidence in writing outlining in detail the rationale for the proposed design changes including hydraulic and or hydrologic computations. This document must be signed and sealed by a licensed professional engineer.

3. Granting of the variance will not be detrimental to the public health, safety or welfare, or injurious to other property in the territory in which said property is located.

APPENDIX

STORM WATER DETENTION REQUIREMENTS
(Excel Spreadsheets)

DRAINAGE PLAN CHECKLIST
(Word Fill-in Document)

DAILY INSPECTION REPORT
(Example: Used by Drain Commissioner's Office)

DETENTION AND RESTRICTION, FINAL INSPECTION REPORT FORM
(Example: Used by Drain Commissioner's Office)

GLADWIN COUNTY ROAD COMMISSION APPLICATION AND PERMIT
(Word Fill-in Document)

MAINTENANCE AGREEMENT
(Example: Used by Drain Commissioner's Office)

DETENTION CALCULATION WORKSHEET

DRAINAGE PLAN CHECKLIST

No site plan or building shall be approved or any other permit issued unless the Owner has provided that the storm water runoff is within the capacities as provided for within the Administrative Guidelines for Storm Water Management, Gladwin County, Michigan.

In order for the Owner, Developer, or Builder to be in compliance with the guidelines he/she shall submit to the Gladwin County Drain Commissioner for review by the Drain Commissioner's designee, three complete sets of the site drainage and grading plan and one copy of the calculations for allowable discharge and on-site storage requirements, as prepared by a Registered Professional Engineer or Architect.

Each of the following items shall be included on the plan:

_____ Total acres of site.

_____ Total acres of watershed draining through the site outlet.

_____ Drainage district lines including sub-district lines contributing to individual storm sewers and rear lot drainage systems.

_____ Location of site including dimension to nearest intersection road or section line.

_____ Existing ground elevations at maximum 50 foot centers, including shots on perimeter of site and 50 foot beyond.

_____ Elevations of ground, edge of pavement, and buildings within 50 foot of site.

_____ Top of curb, gutter, ditch line, and centerline of road elevation at maximum 50 foot intervals.

_____ Existing storm catch basins, manholes, sewers, and culverts showing rim and invert elevation(s).

_____ Proposed elevations showing parking lot grades and control and building elevations.

_____ Lawn/landscape areas.

_____ Location, size, length, slope, and type of proposed storm sewer and rear lot drains.

_____ Rim and invert elevation(s) of proposed manholes and catch basins, including rear lot drainage.

_____ Location of on-site storage showing contour line for top of storage elevation.

_____ Cross-sections, dimensions, and/or details defining the shape of proposed detention basins in non-paved areas.

DRAINAGE PLAN - CHECKLIST (Continued)

Each of the following items shall be included in the submitted calculations:

_____ Drainage District and impervious factor.

_____ Calculation of maximum allowable discharge (Obtain impervious factor from Drain Commissioner and/or designee).

_____ Calculation of on-site storage required.

_____ Calculation of storage volume provided.

_____ Calculation of size of restrictor.

_____ Hydrologic & Hydraulic Calculations for sizing storm sewer systems which will be maintained by a public agency.

_____ Hydrologic and Hydraulic calculations showing there will be no adverse impacts upstream or downstream of the proposed development.

_____ The sizes and locations of upstream and downstream culverts serving the major drainage routes flowing into and out of the development site. Any significant off-site and on-site drainage outlet restrictions other than culverts should be noted on the drainage map.

_____ A maintenance agreement, in form and substance acceptable to the **County**, for ensuring maintenance of any privately-owned storm water runoff facilities. The maintenance agreement shall include the developer's written commitment to provide routine, emergency, and long-term maintenance of the facilities and, in the event that the facilities are not maintained in accordance with the approved drainage plan, the agreement shall authorize the **County** to maintain any on-site storm water run-off facility as reasonably necessary, at the developer's expense.

_____ The name of the engineering firm and the registered professional engineer that designed the drainage plan and that will inspect final construction of the storm water run-off facilities.

Beyond the Gladwin County requirements, the Developer must submit applications for permit with all agencies that regulate storm water within the area of development. These may include Michigan Department of Transportation, Michigan Department of Environmental Quality, Gladwin County Road Commission, and Gladwin County Permits Office.

Sherry Augustine
Gladwin County Drain Commissioner
555 West Cedar Avenue – County Annex
Gladwin, MI 48624

Ph: 989.426.7561
Fax: 989.426.6919
E-mail: drains@gladwinco.com

DAILY INSPECTION REPORT

PROJECT NAME:	**WORK ORDER NO.:**	
CONTRACTOR:	**REPORT NO.**	
SUPERINTENDENT:	**DATE:**	
WEATHER: **(CLEAR, CLOUDY, RAIN, SNOW)**	**TEMPERATURE:**	**INSPECTOR:**

WORK FORCE ON SITE - NUMBER:	**TRADE**	**NUMBER:**	**TRADE**

EQUIPMENT IN USE (Number And Type)

WORK DONE (General description of location n and type of work) (list exact location, amount and type on back)

REMARKS:

VISITORS TO WORK SITE (Name, Affiliation):

Hours on the Project_____	

NOTE: Complete in ink each day. Use reverse side if necessary. Be complete and turn in to Spicer Group office weekly.

BY:_____ **Date:** _____

NAME OF PROJECT:						
ITEM NO.	**DESCRIPTION**	**UNIT**	**LOCATION**	**FROM STATION**	**TO STATION**	AMOUNT

TYPE OF UTILITY INSTALLED (Water, Sewer, Pavement, Size, Class, Description Source):

GROUND CONDITIONS ENCOUNTERED (Clay, Sand, Wet, Dry, Good, Poor or Other & Detail Further):

BACKFILL INSTALLED:

EXISTING UTILITIES ENCOUNTERED:

RELOCATION OF PROPOSED UTILITY AND REASON NECESSARY:

MATERIAL DELIVERED TO SITE (Size, Class, Description, Source):

Sherry Augustine
Gladwin County Drain Commissioner
555 West Cedar Avenue – County Annex
Gladwin, MI 48624

Ph: 989.426.7561
Fax: 989.426.6919
E-mail: drains@gladwinco.com

DETENTION AND RESTRICTION, FINAL INSPECTION REPORT FORM

Name of Site Development:	
Planning Commission Approval Number:	
Location:	
Type of Development:*	
Size of Restrictor:	
Type of Restrictor:**	
Location of Restrictor:	
Required Detention (ft^3):	
Type of Detention:***	
Location of Detention:	
Do As-built Drawings Conform to Present Site Conditions?	
Date of Inspection:	
Inspectors Name and Affiliation:	

* - Residential, Commercial, Subdivision, Etc.

** - Orifice in Outlet Pipe, Metering Outlet Pipe, Square Orifice, Etc.

*** - Parking Lot Ponding, Detention Basin, Etc.

CRA 100 (03/2005)

Gladwin County Road Commission
301 S. State Street
Gladwin, MI 48624
Phone 989.426.7441 / Fax 989.4263.2735

Application No. _____
Permit No. _____
Issue Date _____

APPLICATION AND PERMIT TO CONSTRUCT, OPERATE, USE AND/OR MAINTAIN WITHIN THE RIGHT-OF-WAY OF; OR TO CLOSE, A COUNTY ROAD.
APPLICATION

An applicant is defined as an owner of property adjacent to the right-of-way, the property owner's authorized representative; or an authorized representative of a private or public utility who applies for a permit to construct, operate, use and/or maintain a facility within the right-of-way for the purpose outlined within the application. A contractor who makes application on behalf of a property owner or utility must provide documentation of authority to apply for a permit.

APPLICANT	Name:	**CONTRACTOR**	Company:
	Address:		Address:
	Phone No: Cell No:		Phone No: Cell No:
	Fax No:		Fax No:
	Email Address:		Email Address:

Applicant/Contractor request a permit for the following work within the right-of-way of a county road:

LOCATION: County Road _____ Between _____ And _____
Township _____ Section ____ T ____ R ____ Side of Road N S E W Property ID _____
DATE: Work to begin on _____ Work to be completed by _____

I certify and acknowledge that (1) the information contained in this application is true and correct, (2) the commencement of the work described in this application shall constitute acceptance of the permit as issued, including all terms and conditions thereof and, (3) if this permit is for commercial or residential driveway work, I am the legal owner of the property that this driveway will serve or I am the authorized representative.

Applicant's Signature: _____	Contractor's Signature: _____
Title: Date:	Title: Date:

PERMIT

The TERM "permit Holder" in the terms and conditions set forth on the reverse side hereof, refers to the applicant and the contractor, where applicable. By performing work under this permit, the Permit Holder acknowledges and agrees that this permit is subject to all rules, regulations, terms and conditions shall render this permit NULL AND VOID.

REQUIREMENTS

FEE TYPE	AMOUNT	RECEIPT NO	DATE
Application Fee			
Permit Fee			
Inspection Fee			
Bond			
Deposit			
Other			
To be Billed			

Letter of Credit $ _____ ___ Y ___ N
Surety Bond $ _____ ___ Y ___ N
Retainer Letter ___ Y ___ N
Approved Plans on File ___ Y ___ N
Certificate of Insurance ___ Y ___ N
Attachments/Supplemental Specification ___ Y ___ N

OTHER REQUIREMENTS:

_____
_____
_____

Recommended for Issuance By: _____
Title: _____ Date _____

Approved By: _____
Title: _____ Date: _____

TERMS AND CONDITIONS

1. **Specifications.** All work performed under this permit must be done in accordance with the application, plans, specifications, maps and statements filed with the County Road Commission ("Road Commission") and must comply with the Road Commission's current procedures and regulations on file at its offices and the current MDOT Standard Specifications for Construction, if applicable.

2. **Fees and Costs.** The Permit Holder shall be responsible for all costs incurred by the Road Commission in connection with this permit and shall deposit estimated fees and costs as determined by the Road Commission, at the time the permit is issued.

3. **Bond.** The Permit Holder shall provide a cash deposit, irrevocable letter of credit or bond in a form and amount acceptable to the Road Commission at the time Permit is issued.

4. **Insurance.** The Permit Holder shall furnish proof of general liability insurance in amounts not less than $1,000,000 each occurrence and general aggregate, proof of automobile liability in amounts not less than $1,000,000 combined single limit for each accident, bodily injury per accident, and property damage per accident, and in an amount not less than $500,000 for bodily injury per person. Such proof of insurance shall include a valid certificate of insurance demonstrating that the Road Commission is an additional insured party on the policy. Such insurance shall cover a period not less than the term of this Permit and shall provide that it cannot be cancelled without 30 days advance written notice to the Road Commission, by certified mail, first-class, return receipt requested. This permit is invalid if insurance expires during the authorized period of work described herein.

5. **Indemnification.** In addition to any liability or obligation of the Permit Holder that may otherwise exist, Permit Holder shall, to the fullest extent permitted by law, indemnify and hold harmless the Road Commission and its commissioners, officers, agents, and employees from and against any and all claims, actions, proceedings, liabilities, losses, and damages thereof, and any and all costs and expenses, including legal fees, associated therewith which the Road Commission may sustain by reason of claims for or allegations of the negligence or violation of the terms and conditions of this Permit by the Permit Holder, its officers, agents, or employees, arising out of the work which is the subject of this permit, or arising out of work not authorized by this permit, or arising out of the continued existence of the operation or facility, which is the subject of this permit.

6. **Miss Dig.** The Permit Holder must comply with the requirements of Act 53 of Public Acts of 1974, as amended. CALL MISS DIG AT (800) 482-7171 or www.missdig.org AT LEAST THREE (3) FULL WORKING DAYS, BUT NOT MORE THAN FOURTEEN (14) CALENDAR DAYS, BEFORE YOU START WORK. The Permit Holder assumes all responsibility for damage to or interruption of underground utilities.

7. **Notification of Start and Completion of Work.** The Permit Holder must notify the Road Commission at least 48 hours before starting work, when work is completed, and additionally as directed by the Road Commission.

8. **Time Restrictions.** All work shall be performed Mondays through Fridays between 8:00 a.m. and 5:00 p.m. unless written approval is obtained from the Road Commission, and work shall be performed only during the period set forth in this permit. Perform no work except emergency work, unless authorized by the Road Commission on Saturdays, Sundays, or from 3:00 p.m. on the day proceeding until the normal starting time the day after the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

9. **Safety.** Furnish, install and maintain all necessary traffic controls and protection during Permit Holder's operations in accordance with the *Michigan Manual of Uniform Traffic Control Devices, Part* 6 and any supplemental specifications set forth herein.

10. **Restoration and Repair of Road.** The construction, operation and maintenance of the activity covered by this permit shall be performed by the Permit Holder without cost to the Road Commission unless specified herein. The Permit Holder shall also be responsible for the cost of restoration and repair of the right-of-way determined by the Road Commission to be damaged as a result of the activity which is the subject of this permit. Restoration shall meet or exceed conditions when work is commenced and be in accordance with specifications. The Permit Holder shall be responsible for costs incurred by the Road Commission for emergency repairs performed by or on behalf of the Road Commission for the safety of the motoring public. Said repairs shall be performed with or without notice to the Permit Holder if immediate action is required. This determination shall be in the sole and reasonable opinion of the Road Commission.

11. **Limitation of Permit.** Issuance of this Permit does not relieve Permit Holder from meeting any and all requirements of law, or of other public bodies or agencies. The Permit Holder shall be responsible for securing and shall secure any other Permits or permission necessary or required by law from cities, villages, townships, corporations, property owners, or individuals for the activities hereby permitted. Any work not described by the application, including the time and place thereof, is strictly prohibited in the absence of the application for and issuance of an additional permit or amendment to this permit.

12. **Revocation of Permit.** This Permit may be suspended or revoked at will, and the Permit Holder shall surrender this permit and alter, relocate or remove its facilities at its expense at the request of the Road Commission. It is understood that the rights granted herein are revocable at the will of the Road Commission and that the Permit Holder acquires no rights in the right-of-way and expressly waives any right to claim damages or compensation in case this permit is revoked.

13. **Assignability.** This Permit is not assignable and not transferable unless specifically agreed to by the Road Commission.

14. **Authority.** The statutory authority of the Road Commission to require compliance with permit requirements is predicated upon its jurisdictional authority and is set forth in various statutes including, without limitation and in no particular order, MCL §247.321 et seq; MCL §224.19b; MCL §560.101 et seq; and MCL §247.171 et seq.

MAINTENANCE AGREEMENT

This Agreement entered into the Week Day day of Date, 20Year, by and between Sherry Augustine, Gladwin County Drain Commissioner ("Drain Commissioner"), 555 West Cedar Avenue – County Annex, Gladwin, Michigan, 48624 and Enter Landowner/Developer Name and Address.

Whereas, Landowner/Developer is the owner of certain real property as legally described in Exhibit A attached hereto.

Whereas, Landowner/Developer proposes the construction of a storm sewer system ("the system") to serve all or a portion of the properties to be developed on the lands described in Exhibit A.

Now therefore it is hereby agreed:

1. That Landowner/Developer, its assigns and successors in interest, shall be responsible for the operation and maintenance of the system and for the payment of all costs associated therewith.

2. That Landowner/Developer, its assigns and successors in interest do grant and convey to the Drain Commissioner the right of entry on to the property for purposes of inspection of the system to determine the need for maintenance or improvement.

3. That if required, Landowner/Developer, its assigns and successors in interest shall retain the services of a licensed operator for the system and pay all costs attendant thereto.

4. That Landowner/Developer, its assigns and successors in interest shall operate and maintain the system in compliance with all federal, state and local statutes, laws, ordinances, authorizations, rules, regulations and permits.

5. That in the event that any inspection report indicates the need for maintenance or improvement to any part of the system, Landowner/Developer, its assigns and successors in interest shall cause such work to be done in a timely manner.

6. That if as a result of an inspection, the Drain Commissioner determines the need for maintenance or improvement of the system, he shall notify the Landowner/Developer, its assigns and successors in interest of the necessary maintenance, setting forth the specific details thereof, in writing upon receipt of notice from the Drain Commissioner, Landowner/Developer, its assigns or successors in interest shall cause the specified maintenance and improvement to be completed within 30 days of the receipt of notice or such time period as may otherwise be specified by the Drain Commissioner. In the event that the work specified by the Drain Commissioner is not completed in the specified time, Drain Commissioner shall cause the work to be performed and Landowner/Developer, its assigns or successors in interest shall be responsible for the payment of all costs therefore incurred by the Drain Commissioner, payment to be made within 30 days of invoice. If payment is not made the Drain Commissioner is authorized to seek collection by all means allowed under law or may levy special assessment against properties benefiting from the system, which special assessment will be a lien against the lands until paid or collected as allowed for the collection of taxes and assessments under the laws of the State of Michigan.

7. That Landowner/Developer shall notify, in writing, of the name and address and telephone number of any assigned or successors in interest.

8. That Landowner/Developer, its assigns and successors in interest shall be responsible for all costs incurred by the Drain Commissioner for the operation, maintenance or improvement of the system, inspection and engineering costs, administration costs, attorneys fees and costs including fees and costs incurred in the preparation of this document.

9. That Landowner/Developer, its assigns or successors in interest agree to hold harmless, defend and indemnify the Drain Commissioner, their employees, agents and contractors and the County of Gladwin from any and all liability or enforcement action arising out of the operation, maintenance or improvement of the system including any and all claims for damages or injury to person or property and any and all civil and criminal sanctions, penalties, fines or costs.

10. Once executed this Agreement shall be recorded with the Gladwin County Register of Deeds, Landowner/Developer shall pay all costs of recording and all legal fees incurred in the preparation of this agreement.

_____
Sherry Augustine
Gladwin County Drain Commissioner

STATE OF MICHIGAN)
)ss
COUNTY OF GLADWIN)

On this Week Day day of Date, 20Year before me, a Notary Public in and for said County, appeared Sherry Augustine, Gladwin County Drain Commissioner, to me personally known to be the person described in and who executed the foregoing instrument and acknowledged the same to be his free act and deed.

_____
Name, Notary Public
Acting in Gladwin County, Michigan
My Commission Expires: 00/00/0000

Enter Landowner/Developer Name and Address

By: _____
Enter Landowner/Developer Authorized Signature Name

STATE OF MICHIGAN)
)ss
COUNTY OF GLADWIN)

On this Week Day day of Date, 20Year before me, a Notary Public in and for said County, appeared Enter Landowner/Developer Authorized Signature Name, to me personally known to be the person described in and who executed the foregoing instrument and acknowledged the same to be his free act and deed.

_____
Name, Notary Public
Acting in Enter County County, Michigan
My Commission Expires: 00/00/0000

Prepared By:
Sherry Augustine
Gladwin County Drain Commissioner
555 West Cedar Avenue – County Annex
Gladwin, MI 48624
Telephone: (989) 426-7561

Return To:
Sherry Augustine
Gladwin County Drain Commissioner
555 West Cedar Avenue – County Annex
Gladwin, MI 48624
Telephone: (989) 426-7561

PROJECT:								
PROJECT #:								
DATE:								
ENGINEER:								
LOCATION:								
DRAINAGE DISTRICT:								
PURPOSE:								
GIVEN:								
	1) Township:							
	2) County:							
	3) Parcel #:							
	4) Zoned:							
	5) Design Storm:							
	6) Impervious Factor:							
	7) Reviewing Agency:							
REFERENCES:								
SITE STATISTICS:								
	Total Site	=		sf		0.00	acres	
	Impervious surface	=		sf		0.00	acres	
	Grass	=		sf		0.00	acres	
SITE DRAINAGE SUMMARY:								

ALLOWABLE DISCHARGE AND STORAGE DETERMINATION

PROJECT:
PROJECT #:
DATE:
COMMENTS:
ENGINEER:

DETERMINE ALLOWABLE DISCHARGE:

Drainage District=		
Contributing Drainage Area (acres)=		Asite
Unit Allowable Discharge (cfs/acres) =		qa
Allowable Discharge (cfs) =	**0.00**	Qa

DETERMINE REQUIRED STORAGE:

Weighted "Cw" Factor =		
Proposed Impervious Acres (acres) =	0.00	Ai
Maximum Outflow per Impervious Acre (Qo) =	Qa/ Ai	
Maximum Outflow per Impervious Acre (cfs/acres) =	**#DIV/0!**	Qo
Storage Time (T) =	$(8925/Qo)^{1/2}$-25	
Storage Time (minutes) =	**#DIV/0!**	T
Max. Vol.of Storage per Impervious Acre (Vs) =	[(14280xT)/(T+25)]-(40xQoxT)	
Max. Vol.of Storage per Impervious Acre (cu.ft./acre) =	**#DIV/0!**	Vs
Total Volume of Storage Required for the Site (cu.ft.) =	Vs x Ai	
	#DIV/0!	Vt

DETERMINE RESTRICTOR AREA BASED ON ORIFICE EQUATION

Head Differential (dH) =		Feet
(Center of Orifice to Maximum Ponding Elevation)		
Area of orifice (a) =	$Qa/[0.62(64.4(dH))^{1/2}]$	
Area of orifice (a) =	**#DIV/0!**	Square Feet
Maximun Circular Orifice Diameter =	**#DIV/0!**	Inches

DETERMINE ACTUAL RESTRICTED DISCHARGE (ORIFICE EQUATION)

Diameter of Orifice =		Inches
Area of Orifice =	0.0000	Square Feet
Head Differential (dH) =		Feet
(Center of Orifice to Maximum Ponding Elevation)		
Actual Restricted Discharge (Qr) =	$0.62*A*(2*g*H)^{1/2}$	
Actual Restricted Discharge (Qr) =	**0.00**	CFS

ALLOWABLE DISCHARGE AND STORAGE DETERMINATION

DETERMINE ACTUAL RESTRICTED DISCHARGE (METERING LINE)

Diameter of Line (D) =		Inches
Diameter of Line (D) =	0.00	Feet
Manning's roughness coefficient (n) =		
Slope of Hydraulic Grade Line =		%
Actual Restricted Discharge (Qr) =	$((pi/4)*D^2)(1.486/n)(D/4)^{2/3}(s^{1/2})$	
Actual Restricted Discharge (Qr) =	**#DIV/0!**	CFS

DETERMINE REQUIRED STORAGE BASED ON ACTUAL RESTRICTED DISCHARGE

Actual Restr. Disch., Orifice or Metering Line (Qr):	#DIV/0!	CFS
Proposed Impervious Area (Ai) =	0.00	Acres
	(Golf Course & Residential)	
Maximum Outflow per Impervious Acre (Qo) =	Qr/ Ai	
Maximum Outflow per Impervious Acre (Qo) =	**#DIV/0!**	CFS/ Ai
Storage Time (T) =	$(8925/Qo)^{1/2}-25$	
Storage Time (T) =	**#DIV/0!**	Minutes
Max. Vol.of Storage per Impervious Acre (Vs) =	[(14280xT)/(T+25)]-(40xQoxT)	
Max. Vol.of Storage per Impervious Acre (Vs) =	**#DIV/0!**	CFT/ Ai
Total Volume of Storage Required for the Site (Vt) =	Vs x Ai	
(Based on Actual Restricted Discharge)	**#DIV/0!**	CFT
Volume of Storage Provided =		CFT
Volume of Storage Elevation=		Ft.

RUNOFF COEFFICIENT

Project:		By:		Date:	
Location:		Ckd:		Date:	
Bold One:	**Present**	Developed			

Soil Name & Group	Cover Description	C	Area (acres)	CxArea
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
		Totals =	0.00	0.00
		C (weighted) = Total CxArea/Total Area =	#DIV/0!	

RUNOFF COEFFICIENT

Project:		By:		Date:	
Location:		Ckd:		Date:	
Bold One:	Present	**Developed**			

Soil Name & Group	Cover Description	C	Area (acres)	CxArea
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
				0.00
		Totals =	0.00	0.00
C (weighted) = Total CxArea/Total Area =		#DIV/0!		