HURON COUNTY DRAIN COMMISSION

STORMWATER MANAGEMENT DESIGN STANDARDS

Huron County
Drain Commission

Prepared For:
HURON COUNTY DRAIN COMMISSION
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SECTION I- Introduction

The purpose of these Standards is to establish minimum design requirements and outline a review process for stormwater management practices in Huron County. The Standards outline a review process for new development or redevelopment projects and stipulate the contents required for a complete application.

These Standards aim to promote safe and sustainable land development while protecting natural resources and minimizing adverse stormwater impacts on adjacent and downstream properties. To achieve this, the Huron County Drain Commissioner (HCDC) advocates for the use of Best Management Practices (BMPs) in land development to manage stormwater runoff. BMPs include infrastructure such as detention and retention basins, infiltrative practices like rain gardens and permeable pavements, and structural controls such as swales and berms. Collectively, these practices help regulate the quantity and quality of stormwater runoff, ensuring that the rate, volume, concentration, and composition of stormwater discharged from a site do not negatively affect downstream properties or watercourses.

The Drain Commissioner reserves the right to grant variances to the Standards on an individual basis and to require more than these Standards if he/she feels it is necessary to protect the health and welfare of the public and the environment.

Authority

The Huron County Drain Commissioner will apply these standards within its legal authority and jurisdiction as outlined in the following regulations:

1. The Land Division Act, formally known as the Subdivision Control Act (Act 288 of the Public Acts of Michigan of 1967, as amended).
2. The Michigan Drain Code, Public Act 40 of 1956, as amended.
3. The Mobile Home Commission Act, Act 96 of the Public Acts of Michigan of 1987, as amended.
4. The Condominium Act, Act 59 of the Public Acts of Michigan of 1978, as amended.
5. Review authority granted by local municipalities.

Definitions

1. Drain Commissioner: The Huron County Drain Commissioner or his designee.
2. Proprietor: Any person, landowner, firm, association, partnership, corporation, or combination of any of them, who submits a site plan for drainage review (may also be referred to as a developer or applicant).
3. Storm Water Runoff: The water from a rainstorm, snow melt, or other natural event or process, which flows over the surface of the ground or is collected in a drainage system.
4. 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.

5. Twenty-five 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.
6. One-hundred Year Design Storm: A precipitation event with a duration equal to the time of concentration, having a one-percent chance of occurring in any one year.
7. Watercourse: Any natural or artificial stream, river, creek, channel, ditch, canal, conduit, culvert, drain, waterway, roadway, or swale in which water flows in a definite direction, either continuously or intermittently.
8. Drainage District/Watershed: All drainage areas contributing surface water runoff upstream of a discharge location of the proposed development.
9. Impervious Surface: Surface that does not allow storm water runoff to slowly percolate into the ground.
10. Pervious Surface: Surface that allows water to pass through it, enabling infiltration into the ground rather than creating surface runoff.
11. EGLE: Michigan Department of Environment, Great Lakes, and Energy.
12. Discharge: The release or outflow of storm water from any source.
13. Peak Discharge: The maximum rate of flow of storm water runoff at a given location.
14. Allowable Discharge: The maximum allowable restricted discharge from a site after development or redevelopment as calculated in accordance with these Guidelines.
15. Detention: A system which is designed to capture storm water runoff and release it over a given period of time through an outlet structure at a controlled rate.
16. Retention: A system which is designed to capture storm water runoff and contain it until it infiltrates into the soil or evaporates.
17. BMP: A stormwater BMP, or Best Management Practice, refers to practices or techniques used to manage and treat stormwater runoff. These practices aim to minimize the impact of stormwater on the environment, prevent pollution, and manage the quantity and quality of runoff.
18. Drain: Any drain as defined in and established under the Drain Code of 1956, as amended, being MCL 280.1 et seq.

SECTION II- Submittal and Review Procedure

The stormwater review process for land development in Huron County involves several key steps to ensure that stormwater is managed effectively and meets regulatory requirements. Below is an overview of the submittal and review procedure.

Review Required:

The Standards apply to private and public land development and redevelopment projects within Huron County. The following types of developments shall be subject to review under these Standards:

- Plats.
- Site condominiums and traditional condominiums with County Drains.
- Sites that discharge directly into a County Drain.
- Other developments that require a site plan review where a municipality has granted the Drain Commissioner review authority of the stormwater management system.

Redevelopment and site addition projects requiring site plan review shall comply with the current Standards for the redeveloped or newly constructed portion of the site only. However, the Drain Commissioner reserves the right to require the entire site be brought into compliance with the current Standards if deemed necessary for the situation. A stormwater review is not required for the construction of single and two-family residential structures on a single parcel of land.

Fee Schedule, Review Deposit:

The fees for reviewing a stormwater management plan under these Standards are set forth in the Fee Schedule below.

Stormwater Management Review – Fee Schedule		
General Development (Commercial / Redevelopment / etc.)		
Area of Disturbance	Review Fee	Review Deposit
Less Than 1 acre	$800	$500
1-19 acres	$1,200	$500
20 acres or more	$2,000	$500

Plat / Site Condominium / Condominium		
Review Submittal	Review Fee	Review Deposit
Preliminary Plat Review		
All Projects	$500	
Construction Plan Review		
1-10 Lots/Units	$2,000	$500
11-30 Lots/Units	$2,500	$500
31 Lots/Units or more	$3,500	$500

Fees fund the review of the stormwater management plans by the Drain Commission, or a reviewing engineer assigned by the Drain Commission. If the expense to review the stormwater design exceeds the amount of fees collected, the Applicant will be responsible for the payment of all additional costs. Any additional costs will be billed to the applicant prior to issuing Final Approval.

433 and 425 Agreements
The Fee Schedule does not include any additional costs associated with a 433 or 425 Agreement if deemed necessary for a development. The required contribution for future maintenance of the drain and additional costs associated with drafting and recording the legal documents are not included in the Fee Schedule and will vary depending on the project.

Drain Permit
Any proposed work that requires crossing, connecting to, or otherwise constructing within the Right-of-Way (ROW, also referred to as a ‘drain easement’) of a county drain, a permit application must be completed and submitted to the office of the Huron County Drain Commission (HCDC). The standard permit application form is located on the HCDC website. A Stormwater Permit and a Drain Permit may be required for the same project.

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

Conceptual Site Plan Meeting:

The proprietor shall have the opportunity to submit a conceptual design and layout of the proposed development to the Drain Commission for a preliminary meeting. The Drain Commission, or their reviewing engineer, will review the conceptual design information and determine if it is consistent with these Standards and offer preliminary feedback on the design. The intention of this preliminary meeting is to identify various site constraints and communicate what will be expected by the Drain Office for compliance with the Standards. A preliminary meeting is not required for every project but can allow all participants in the stormwater review process to coordinate their efforts and avoid delays or substantial design revisions during the construction review process.

Review Procedure

The stormwater review process involves a two-step or three-step review depending on the two types of developments noted in the Fee Schedule. A general development review is a two-step review consisting of a Construction Approval which occurs before the construction process begins, and a Final Approval which occurs after construction of the stormwater system is complete. A plat, site condominium, or condominium development review is a three-step process and includes a preliminary review step which takes place early in the design process before detailed plans and calculations are prepared. Additional information regarding the review process is detailed in the following sections.

Preliminary Review

A preliminary review of the stormwater design is only required for plat, condominium, and site condominium projects. Approval of the preliminary plat is required by the local governing body under the Land Division Act and allows the Drain Commission to offer input on the design that can assist the developer as they proceed into construction ready documents.

Construction Review & Approval

Prior to any construction commencing, applicants must submit a detailed application package to the HCDC which demonstrates the proposed stormwater design is compliant with the Standards. The following documents are required for review and Construction Approval by the Drain Commissioner.

1. Site Plan Review Application
2. Review Fee
3. Construction Drawings.
4. Stormwater Calculations.

A hard copy print and electronic PDF copy of all submittal documents must be provided to the Drain Commission for review. The HCDC may ask for additional copies to be provided if the review

will be performed by a consultant engineer. Construction drawings and stormwater calculations provided for review must be signed and sealed by a professional engineer in the state of Michigan.

The Drain Commission, or their reviewing engineer, will review the submittal documents for compliance with these Standards. The Drain Commission shall approve, approve with conditions, or disapprove an application within 30 days of receiving the required materials and fee.

Final Review & Approval

After construction of the stormwater system is complete, a Final Approval is required to verify that all stormwater management systems are constructed in accordance with the approved design and operating correctly. The following items are required for review and Final Approval by the Drain Commission.

1. Construction record drawings ("as-builts") showing any deviations from the original design and documenting the final configuration of stormwater facilities. A letter of certification by a professional engineer shall accompany the construction record drawings or may be accepted in lieu of record drawings for some projects at the Drain Commissioner's discretion. A template Engineer's Certificate of Construction is available upon request. This is required for all development reviews.
2. For projects that require a 433 or 425 Agreement to be executed, all documentation must be complete and recorded prior to the Drain Commission signing the Final Plat or granting Final Approval. Additional documentation may include, but is not limited to the following: easement agreements, encroachment agreements, deposit of future maintenance fund, GIS shapefiles, inspection documentation, and maintenance agreements.
3. Payment of any outstanding review fees.

Construction record drawings must be submitted prior to release of any review deposit. The Drain Commission will review construction record drawings for completeness, and respond with written comments or acceptance within thirty (30) days of submittal or resubmittal. The review period begins upon receipt of a complete application, design documents, and fee.

Changes to Plan After Approval

Any proposed changes made to the approved plan shall be submitted to the Drain Commission and their engineer for review and approval. Upon receipt of this information, the Drain Commission will determine if an additional review will be required or whether modifications to the permit will be necessary. Changes made without resubmission and approval may result in revocation of approval.

Expiration of Approval:

Approval of construction drawings by the HCDC is valid for two calendar years.

Variances:

It is understood that the Standards may not account for unique site conditions and enforcing these Standards on small or redeveloped sites may be challenging. In such cases, waivers or variances from specific provisions may be requested by applicant. These alternatives will be reviewed and approved on a case-by-case basis by the Huron County Drain Commissioner when full compliance with the standards presents exceptional hardship or practical difficulties. Proposed variances from the specified minimum requirements must align with the overall goals of the Standards and it is the responsibility of the applicant to justify a variance is necessary and that the proposed design takes every feasible measure to comply with the intent of the Standards.

Other Approvals:

Approval from the Drain Commissioner's office does not relieve the applicant of the need to obtain other applicable permits or approvals as required by federal, state, county and local agencies.

The additional requirements and documentation for the establishment or extension of County Drains under Section 433 and Section 425 of the Michigan Drain Code is not fully covered in these Standards and must be coordinated with the Huron County Drain Commissioner on an individual project basis.

SECTION III – Stormwater Management Design Requirements

These standards are designed to manage stormwater runoff effectively, reduce pollution, and protect local water resources. The minimum design standards are summarized in the table below.

Standard	Applies	Design Criteria
Water Quality "First flush"	All Sites	Infiltrate the first 1 inch of runoff from the project site. Where site conditions preclude infiltration, extended detention for the first flush volume must be utilized. Extended detention of the runoff volume for a period of 24 hours resulting in a drawdown time no greater than 72 hours.
Channel Protection	New and redevelopments that discharge to streams and rivers (directly, or through a storm sewer or ditch); not required for direct discharges to Lake Huron	The post-development runoff rate and volume shall not exceed the pre-development rate and volume for the 2-year, 24-hour storm event. Retention of the volume increase is required. Where site conditions preclude infiltration, extended detention for the increase in runoff volume must be utilized. Extended detention of the runoff volume for a period of 24 hours resulting in a drawdown time no greater than 72 hours.
Flood Control	All Sites	Collection and Conveyance: Design storm sewer and swales for the 10-year storm, and open channels for the 25-year storm. Detention Basin: Store runoff from the 25-year storm with a maximum release rate of 0.13 cfs per acre. Retention Basin: Store all runoff from the 100-year storm. Overflow Routes for Extreme Flood: Identify overflow routes and the extent of high water levels for the 100-year flood to ensure no adverse impacts offsite or internal to the site. Where overland flow routes do not exist: 1. Protect buildings with redundant storm sewer system sized for the 100-year storm; and 2. Increase the size of the detention and retention basin to store runoff for 2 times the Flood Control volume.

The following sections detail the requirements developers must meet to ensure compliance with the design Standards.

Water Quality

The primary objective of the water quality design requirement is to reduce the quantity of pollutants in stormwater runoff generated by land development and protect surface water bodies, groundwater, and aquatic habitats. This includes minimizing the impacts of pollutants such as sediments, nutrients, oils, heavy metals, and other contaminants that can harm water quality and aquatic ecosystems. The stormwater design of every site must retain or treat the runoff generated from the first 1-inch of runoff generated, also known as the "first flush". This is accomplished in the stormwater design by including BMPs that force infiltration of the first flush volume when site conditions allow. If the proprietor's design engineer determines site conditions are not conducive for infiltration, extended detention for the first flush volume must be utilized. When using extended detention, the water quality runoff volume must be detained for a period of 24 hours resulting in a drawdown time no greater than 72 hours.

Situations may arise where "hot spot" containment may be required to protect against contamination from high-risk activities within a proposed development. Depending on the proposed land use and associated risks of stormwater contamination, the Drain Commission may require that spill containment be included in the stormwater design to isolate any harmful substances prior to entering into the detention or retention basin areas.

Channel Protection

The channel protection design requirement is crucial for managing the impacts of increased stormwater runoff on natural and constructed watercourses. These requirements aim to mitigate erosion, stabilize channel banks, and protect aquatic habitats by controlling the flow and volume of stormwater runoff discharged during the 2-year storm event.

In order to mitigate the impact of new development on existing water courses, the proprietor must calculate the increase in runoff volume during the 2-year storm event due to the proposed site improvements. The increase in runoff volume during the 2-year storm event is considered the channel protection volume and must be infiltrated if the site conditions allow. Similar to the water quality requirement, if the proprietor's design engineer determines site conditions are not conducive for infiltration, extended detention of the channel protection volume must be utilized. When using extended detention, the channel protection volume must be detained for a period of 24 hours resulting in a drawdown time no greater than 72 hours.

Flood Control

The required storage volume to comply with the Flood Control requirement will vary depending on the site conditions and availability of an adequate stormwater outlet. For developments with a detention basin that includes a controlled release into an adequate outlet, the design storm event for the flood control volume is the 25-year storm. The maximum allowable release rate for a detention basin is 0.13 cfs per acre for the contributing watershed. For developments with a retention basin that relies entirely on infiltration to mitigate stormwater runoff, the design storm event for the flood control volume is the 100-year storm.

For all developments that discharge runoff offsite, the applicant is responsible for verifying if downstream capacity is adequate for the proposed development. If there is insufficient downstream capacity, the developer may implement offsite improvements, or the maximum allowable release rate must be reduced below the standard rate of 0.13 cfs per acre.

When the site is located adjacent to or within a floodplain, excavation of new floodplain in lieu of traditional stormwater detention may be required. The excavated volume must be equal to the standard detention basin storage volume. When utilizing floodplain excavation for stormwater detention, infiltration or extended detention must still be provided for the water quality and/or channel protection volume.

SECTION IV – Stormwater Design Methodology

The following sections detail the design equations and methodologies required to demonstrate a stormwater design is compliant with the design Standards.

Water Quality & Channel Protection

In order to promote groundwater recharge and protect downstream watercourses, the water quality and channel protection requirements require that infiltration be utilized if feasible for the site characteristics. Since both the water quality and channel protection metrics require infiltration for their respective volumes, the stormwater system will be designed to infiltrate the larger volume of the two. For water quality compliance, the first flush volume produced by the 90% non-exceedance storm event must be calculated using the following equation. The stormwater runoff calculation must utilize the runoff coefficients in Table 1.

$$V_{WQ} = 1 * 3630 * C * A$$

Where:

V_{WQ} = Volume of water quality runoff during the first flush (cft)
1 = Rainfall amount for the 90% non-exceedance storm event (in)
3630 = Factor to convert acre-inches to cubic feet
C = Post development runoff coefficient
A = Contributing area (acres)

The applicant must calculate the increase in runoff produced by the 2-year 24-hour storm event using the rational method or other industry accepted methodology as determined by the reviewing engineer. The increase in runoff produced by the 2-year 24-hour storm event is considered the channel protection volume and is calculated using the following equation.

$$V_{2Y-EX} = 2.21 * 3630 * C_{EX} * A$$
$$V_{2Y-PD} = 2.21 * 3630 * C_{PD} * A$$

Where:
V_{2Y-EX} = Volume of runoff during the 2-year storm event for the existing property (cft)
V_{2Y-PD} = Volume of runoff during the 2-year storm event for the post development condition (cft)
C_{EX} = Existing site runoff coefficient
C_{PD} = Post-development runoff coefficient
2.21 = Rainfall amount for the 2-year storm event (in)
3630 = Factor to convert acre-inches to cubic feet
A = Contributing area (acres)

$$V_{CP} = V_{2Y-PD} - V_{2Y-EX}$$

Where:
V_{CP} = Channel protection volume (cft)

If infiltration of the water quality or channel protection volume is not feasible due to site constraints, extended detention of the larger volume is required. The peak release rate for extended detention of the channel protection or water quality volume shall be calculated using the following equation.

$$Q_{ED} = \frac{V_{ED}}{36 * 3600}$$

Where:
Q_{ED} = peak extended detention release rate (cfs)
V_{ED} = Larger volume of the water quality or channel protection volume (cft)
36*3600 = half of the base time of outflow hydrograph (sec)

A development may only utilize extended detention of the water quality or channel protection volume if any of the following criteria are met for the property:

1. Contaminated soils are present.
2. Wellhead protection areas.
3. High groundwater or bedrock (high season groundwater less than 2 feet from the bottom of the proposed infiltration BMP).
4. Land use with high risk for contamination.

5. Soils types not conducive for infiltration. Typically, HSG C or HSG D soils with an infiltration rate of less than 0.24 inches per hour.

Flood Control

The rational method shall be used to calculate the required storage volumes for detention and retention basins to comply with the flood control requirement. Runoff coefficients for use in runoff calculation are provided in Table 1 and rainfall data is provided in Table 2.

Detention: Detention basins shall be sized to store the runoff from a 25-year, 24-hour rainfall event. When calculating the required storage volume for detention basins, infiltration can be utilized to reduce the flood control volume. However, only the volume below a positive outlet in the detention basin or upstream infiltration BMPs can be counted in the infiltration calculation. The volume stored in the sediment forebay and extended detention areas can be counted toward the required detention volume being provided.

Retention: Retention basins shall be sized to store the total runoff from a 100-year, 24-hour rainfall event. When calculating the required storage volume for retention basins, infiltration cannot be accounted for to reduce the flood control volume. The volume stored in the sediment forebay can count toward the required detention volume.

$$V_{FC} = 5.34 * 3630 * C * A$$

Where:
V_{FC} = Required storage volume for the flood control requirements (cft)
C = Post-development runoff coefficient
5.34 = Rainfall amount for the 100-year storm event (in)
3630 = Factor to convert acre-inches to cubic feet
A = Contributing area (acres)

Overland Floodway Route

Developments that do not include an overland flood route to an acceptable stormwater outlet must provide the following:

1. Detention or retention basins must be sized for two times the flood control volume.
2. Buildings must be safeguarded against flooding with two independent enclosed drainage systems. Each enclosed pipe shall be sized to independently convey the peak runoff from a 100-year storm event for the contributing area.

There are other industry accepted methodologies for predicting stormwater runoff which may be allowable at the discretion of the Huron County Drain Commission. Additionally, an alternative method may be required by the Huron County Drain Commission for sizing the drainage systems on large developments where a different methodology is better suited to provide accurate results.

Table 1: Rational Method Runoff Coefficient

Type of Surface	Runoff Coefficient		
Water Surfaces	1.00		
Impervious: Roofs, Asphalt, Concrete	0.95		
Gravel	0.85		
Greenspace or Semi-pervious: lawns, parks, playgrounds, etc.	Slope <4%	Slope 4%-8%	Slope >8%
Hydrologic Soil Group A	0.15	0.20	0.25
Hydrologic Soil Group B	0.25	0.30	0.35
Hydrologic Soil Group C	0.30	0.35	0.40
Hydrologic Soil Group D	0.45	0.50	0.55

Table 2: Rainfall Data

Duration	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
5-min:	0.27	0.31	0.39	0.46	0.57	0.65	0.74
10-min:	0.39	0.46	0.57	0.68	0.83	0.96	1.09
15-min:	0.47	0.56	0.70	0.83	1.01	1.17	1.33
30-min:	0.69	0.81	1.02	1.21	1.48	1.71	1.95
60-min:	0.91	1.06	1.32	1.57	1.93	2.24	2.57
2-hr:	1.12	1.30	1.62	1.92	2.38	2.77	3.18
3-hr:	1.24	1.43	1.78	2.11	2.62	3.06	3.54
6-hr:	1.47	1.67	2.06	2.43	3.03	3.56	4.14
12-hr:	1.71	1.93	2.36	2.78	3.46	4.06	4.72
24-hr:	1.95	2.21	2.71	3.18	3.94	4.61	5.34
Source: NOAA Atlas 14, Volume 8, Version 2 Location: Bad Axe, Michigan (Latitude: 43.7966°, Longitude: -82.9978°)							

Existing Drainage Patterns

All stormwater discharges from the development site must outlet within the same watershed where the flows originated unless the Drain Commission grants approval. The developer's engineer shall submit with the design documents, a topographical map of the entire contributing drainage area, and indicate any drainage originating outside of the project limits, in addition to any natural water courses and county drains that traverse or border the proposed development. Surface water flows from offsite land shall be routed around the proposed development's stormwater management system if possible. If routing offsite runoff around the proposed development is not feasible, the proposed stormwater infrastructure must be sized to provide detention for the entire contributing watershed in accordance with the current Flood Control standard stipulated in these guidelines.

Geotechnical Investigation and Infiltration

A soils investigation by a qualified geotechnical consultant is required for retention and detention basins, subsurface detention systems, and other infiltration systems to assess soil infiltration characteristics and groundwater elevation. The proprietor must submit a soil-boring log, taken within the basin bottom area to a depth of 5 feet below the proposed basin bottom elevation. Information regarding the seasonal groundwater elevations and historic high groundwater elevations must also be provided for review.

In addition to the soil boring information, an in-field infiltration test must be performed for all retention basins and other infiltrative BMPs. To calculate the design infiltration rate, the infiltration rate obtained from field permeability testing shall be halved, with a maximum allowable design infiltration rate of 5 inches per hour. The design infiltration rate must be based on the least permeable soil layer located at the proposed bottom elevation of the infiltrative BMP.

In certain development situations where infiltration will not be utilized in the design due to site characteristics or at the discretion of the reviewing engineer, alternative soils information can be provided in lieu of soil borings. A Web Soil Survey Report for the development property from the United States Department of Agriculture (USDA) including a soil map and soil characteristics can be considered an acceptable soils investigation.

SECTION V- Stormwater BMP Design

Please refer to Appendix C for typical details of a detention basin and retention basin.

Storm Sewer Pipe Design:

1. All storm sewer pipes must be sized for a 10-year storm without surcharging if possible. Where this is not possible, surcharging may be allowed to 1 foot below the top of casting.
2. Pipe sizing shall be determined using hydrologic and hydraulic calculations, including Manning's equation for flow capacity. A catchment figure must be provided which depicts the watershed for each inlet into the stormwater system.
3. Minimum pipe slopes must be set to produce a self-cleaning velocity of 2.5 ft/sec when the pipe is flowing full.
4. All storm sewer materials must comply with the authority having jurisdiction over the storm sewer system.
5. Manholes shall be provided at all pipe junctions, changes in alignment, and at regular intervals not to exceed 350 feet.
6. All catch basins receiving surface water runoff must have a minimum sump depth of 24 inches.
7. Outlet pipes and flared end sections must include energy dissipation. Riprap protection or equivalent erosion control measures shall be sized according to the erosive velocities expected during the design storm event.

8. Restricted conveyance systems designed to create backflow into stormwater storage facilities are not permitted. A storm sewer pipe shall not be used as both an inlet and outlet to a detention basin.

Detention Basin Design:

1. All detention basins must include a sediment forebay for all pipe or surface inlets. The sediment forebay must be sized for 15% of the water quality volume. If there are multiple pipe inlets, the forebay at each inlet must be sized for the 15% of the water quality volume entering each pipe segment.
2. Soil borings or a test pit are required at all detention basin locations to confirm a minimum of 2 feet separation is provided between the highest known groundwater elevation and the bottom of basin elevation.
3. The inlet and outlet locations in a detention basin shall be placed on opposite ends to maximize the flow path and water quality benefit. If this is not feasible due to site constraints, the design must include baffles or riprap barriers between the pipe ends to lengthen the flow path.
4. Side slopes shall be a maximum of 3:1 (H:V). Where basins are to be maintained as a mown lawn, side slopes shall be a maximum of 4:1 (H:V) to facilitate mowing.
5. Detention basins without an acceptable surface water overflow route shall be designed for 2 times the required flood control volume.
6. A design permanent pool in a wet detention basin shall have a minimum depth of 3 feet across the deepest part of the basin.
7. A minimum 8-foot wide safety bench shall be constructed on the slopes of wet ponds with a permanent pool 3 feet or deeper. The safety bench shall have a maximum slope of 6:1 (H:V) and extend a minimum of 8 inches below the permanent pool level and a minimum of 8 inches above the permanent pool level.
8. The bottom of dry detention basins must be graded to ensure positive drainage toward the pipe outlet. A minimum longitudinal slope of and cross slope of 1% shall be provided. If site conditions prevent achieving these minimum slopes, an underdrain system with flatter slopes may be permitted.
9. When spill containment is deemed necessary by the Drain Commission, all pipes contributing runoff from the high risk area must enter the spill containment BMP.
10. Staged low flow outlet: When a staged outlet is required to provide extended detention of the water quality or channel protection volume, the lowest stage opening shall be sized to comply with the extended detention release rate. The flood control opening shall be placed at the elevation in the basin corresponding to the design channel protection volume and sized so that the cumulative discharge from all openings is limited to the maximum allowable discharge at the design high water level. The outlet and all orifices must include provisions to protect against clogging. The orifice equation should be solved for “area” and used to properly size the outlet orifices.

$$A = \frac{Q}{c\sqrt{2gH}}$$

Where:
A = required area (square feet)
Q = required outflow (cubic feet per second)
c = orifice coefficient (approximately 0.6)
2g = 2 times the gravitation constant (g = 32.2 feet per second)
H = height of design high water level above center of orifice outlet (feet)

11. Every detention basin must include a primary overflow at the design high water elevation. This is typically provided over a weir or through the rim of an outlet control structure. The primary overflow must be designed to convey the 10-year peak inflow from the entire contributing area. The weir equation must be used to note the design flow depth over the primary overflow spillway during the 10-year storm event.
12. The outlet pipe for a detention basin must have the capacity to convey the combined flow from the 10-year peak flow over the primary overflow and the discharge from the low flow orifice(s) at the maximum design high water level.
13. Pipe outlets from a detention basin into open channels or grassed swales shall enter at an angle of 90 degrees or less with the direction of flow. All pipe outlets must include energy dissipation sized to prevent erosion during the design peak flow.
14. Every detention basin must also include a secondary overland spillway. The secondary overland spillway must have the capacity to convey the 10-year peak flow with a maximum flow depth of 1 foot. The spillway shall be sized using the weir equation and provide a minimum freeboard of 6 inches above the design flow depth in the spillway. The crest of the secondary overland spillway shall be set at the design flow depth over the primary overflow.
15. The top of berm elevation shall be a minimum of 0.5 foot above the design flow depth over the highest spillway. The minimum allowable spillway depth (distance between spillway crest and top of berm) is 1 foot.

Retention Basin Design

1. All retention basins must include a sediment forebay for any pipe or surface inlets. The sediment forebay must be sized for 15% of the water quality volume. If there are multiple pipe inlets, the forebay at each inlet must be sized for the 15% of the water quality volume entering each pipe segment.

2. Soil borings or a test pit is required at all retention basin locations to confirm a minimum of 2 feet separation is provided between the highest known groundwater elevation and the bottom of basin elevation.
3. An in-field infiltration or percolation test is required for each retention basin and should be performed at the bottom of basin elevation.
4. The infiltration area of the retention basin must be sized so the drawdown time is no more than 72 hours.
5. The infiltration area shall be defined as the bottom of the basin, or the horizontal projection of the side slopes up to half of the design water depth above a permanent pool.
6. Side slopes shall not be steeper than 3:1 (H:V). Where basins are to be maintained as a mown lawn, side slopes shall be no steeper than 4:1 (H:V) to facilitate mowing.
7. Retention basins without an acceptable surface water overflow route shall be designed for 2 times the required flood control volume.
8. The bottom of dry retention basins should graded flat to encourage a uniform distribution and promote infiltration.
9. A permanent pool in a wet retention basin shall have a minimum depth of 3 feet across the deepest part of the basin.
10. A minimum 8-foot wide safety bench shall be constructed on the slopes of wet ponds with a permanent pool 3 feet or deeper. The safety bench shall have a maximum slope of 6:1 (H:V) and extend a minimum of 8 inches below the permanent pool level and a minimum of 8 inches above the permanent pool level.
11. When spill containment is deemed necessary by the Drain Commission, all pipes contributing runoff from the high risk area must enter the spill containment BMP.
12. When possible, retention basins should include a primary overflow at the design high water elevation. The primary overflow must be designed to convey the 10-year peak inflow from the entire contributing area. The weir equation must be used to note the design flow depth over the primary overflow spillway during the 10-year storm event.
13. Every retention basin must include a secondary overland flood spillway. The secondary overland spillway must have the capacity to convey the 10-year peak flow with a maximum flow depth of 1 foot. The spillway shall be sized using the weir equation and provide a minimum freeboard of 6 inches above the design flow depth in the spillway. The crest of the secondary overland spillway shall be set at the design flow depth over the primary overflow or at the design highwater elevation if a primary spillway is not provided.
14. The top of berm elevation shall be a minimum of 0.5 foot above the design flow depth over the highest spillway. The minimum allowable spillway depth (distance between spillway crest and top of berm) is 1 foot.

Hot Spot Spill Containment

A hot spot in this context refers to proposed land uses that generate higher concentrations of pollutants, particularly those with toxic, hazardous, or oil-based contaminants, which can degrade water quality if not properly managed. These sites require enhanced stormwater treatment to prevent pollutants from entering natural water bodies.

Examples of Hot Spot Land Uses:

- Gas stations and vehicle service centers (oil, grease, fuel spills)
- Industrial facilities and manufacturing plants (chemicals, heavy metals)
- Truck stops and freight terminals (diesel fuel, sediments)
- Recycling centers and scrap yards (metals, toxins)
- Airports (de-icing chemicals, jet fuel runoff)
- Outdoor storage and loading areas (spills from stored materials)

Stormwater Management Considerations:

- Pretreatment systems (oil-water separators, grit chambers)
- Enhanced filtration (sand filters, proprietary treatment devices)
- Containment strategies (impervious liners, secondary containment)
- Restrict infiltration (to prevent groundwater contamination)

Because stormwater infiltration at hot spot sites can risk groundwater contamination, the HCDC may restrict or prohibit infiltration-based stormwater controls at these locations.

Rear Lot Drainage

All residential properties in plat or site condominium must include rear yard drainage to prevent localized flooding and standing water. Rear yard drainage must include underdrain in addition to properly sized overland swales. Calculations must be submitted to the Drain Commission or their designee to ensure the rear lot tile drains and overland swales can handle the 10-year design storm event for the design watershed. All lots requiring rear lot drainage must be adjacent to a rear lot catch basin. Rear lot drainage tiles must have a minimum cover of 2 feet. Both the drainage tile and catch basin materials must be approved by the Drain Commissioner or their designee. The minimum diameter for a rear lot catch basin is 2 feet.

Appendix A: Site Plan Review Application

Print

Reset Form

CRA 100 Rev 11/21

APPLICATION AND PERMIT

to construct, operate, maintain
use and/or remove within a county
road or drain right-of-way

Permit Number _____

Issuance Date _____

BOARD OF COUNTY ROAD COMMISSIONERS OF HURON COUNTY, MICHIGAN

417 S. Hanselman Street
Bad Axe, Michigan 48413
Phone: (989) 269-6404 Fax: (989) 269-8491

If applicant hires a contractor to perform the work, BOTH must complete this form and BOTH assume responsibility for the provisions of this Application and Permit.

APPLICANT	CONTRACTOR
NAME:	NAME:
MAILING ADDRESS:	MAILING ADDRESS:
EMAIL ADDRESS	EMAIL ADDRESS
TELEPHONE NO.	TELEPHONE NO.

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

FINANCIAL REQUIREMENTS		ATTACHMENTS REQUIRED	
Application Fee	$		
Permit Fee	$	Plans and Specs	
Est. Inspect. Fee	$		
Bond	$	Bond	
Deposit	$	Proof of Insurance	
Other	$	Yes ☐	N0 ☐
To Be Billed	$		
Receipt Number		P.I. $	P.D. $
Dated		Other	

APPLICATION

Property Owner, Applicant and/or Contractor request a Permit for the purpose indicated in the attached plans and specifications at the following location:

CITY _____ /or TOWNSHIP _____ SECTION _____

NAME OF ROAD OR DRAIN _____ LOCATION _____

For a period (maximum 12 months) beginning: _____ and ending _____ and agrees to the terms of the permit.

DESCRIPTION OF PROPOSED WORK:

PERMIT

A permit is granted in accordance with the foregoing application for the period stated above, subject to the following terms (see reverse side) agreed to by the Permit Holder. *"Permit Holder" includes the Property Owner, the Applicant and the Contractor.*

HURON COUNTY ROAD COMMISSION ("Commission")
APPROVED:

_____ Investigator

Title _____ *Date* _____

PROPERTY OWNER*
(When not Applicant)

_____
Signature

Please Print _____ *Date* _____

*When Applicant is a Public Utility, need for Property Owners Signature may be waived by Commission dependent on project.

1. **Specifications.** All work performed under this permit must be done in accordance with the plans, specifications, maps and statements filed with the Commission and must comply with the Commission's current requirements and specifications on file at its offices and M.D.O.T. specifications.
2. **Fees and Costs.** Permit Holder shall be responsible for all fees and costs incurred by the Commission in connection with this permit and shall deposit estimated fees and costs as determined by the Commission, at the time the permit is issued.
3. **Bond.** Permit Holder shall provide a cash deposit, letter of credit or bond in a form and amount acceptable to the Commission at the time permit is issued.
4. **Insurance.** Permit Holder shall furnish proof of liability and property damage insurance in the amount stated on this permit naming the Commission as an insured. Such insurance shall cover a period not less than the term of this permit and shall provide that it cannot be cancelled without ten (10) days advance written notice by certified mail with return receipt required to the Commission.
5. **Indemnification.** Permit Holder shall hold harmless and indemnify and keep indemnified the Commission, its officers and employees from all claims, suits and judgments to which the Commission, its officers, or employees may be subject and for all costs and actual attorney fees which may be incurred on account of injury to persons or damage to property, including property of the Commission, whether due to the negligence of the Permit Holder or the joint negligence of the Permit Holder and the Commission, arising out of the work under this permit, or in connection with work not authorized by this permit, or resulting from failure to comply with the terms of this permit, or arising out of the continued existence of the work product 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 AT LEAST THREE FULL WORKING DAYS, BUT NOT MORE THAN TWENTY ONE (21) CALENDAR DAYS, BEFORE YOU START WORK. Permit Holder assumes all responsibility for damage to or interruption of underground utilities.
7. **Notification of Start and Completion of Work.** Permit Holder must notify the Commission at least 48 hours before starting work and must notify the Commission when work is completed.
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 Commission, and work shall be performed only during the period set forth in this permit.
9. **Safety.** Permit Holder agrees to work under this permit in a safe manner and to keep the area affected by this permit in a safe condition until the work is completed. All work site conditions shall comply with Michigan Manual of Uniform Traffic Control Devices.
10. **Restoration and Repair of Road or Drain.** Permit Holder agrees to restore with-in 15 days or as otherwise directed the road or drain right-of-way to a condition equal to or better than its condition before the work began; and to repair any damage to the road or drain right-of-way which is the result of the facility whenever it occurs or appears.
11. **Limitation of Permit.** This permit does not relieve Permit Holder from meeting other applicable laws and regulations of other agencies. Permit Holder is responsible for obtaining additional permits or releases which may be required in connection with this work from other governmental agencies, public utilities, corporations and individuals, including property owners. Permission may be required from the adjoining property owners.
12. **Revocation of Permit.** The 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 Commission.
13. **Violation of Permit.** This permit shall become immediately null and void if Permit Holder violated the terms of this permit, and the Commission may require immediate removal of Permit Holder's facilities, or the Commission may remove them without notice at Permit Holder's expense.
14. **Assignability.** This permit may not be assigned without the prior approval of the Commission. If approval is granted, the assignor shall remain liable and the assignee shall be bound by all the terms of this permit.
15. This permit is subject to supplemental specifications on file with the Commission and Act 200 of Public Acts of 1969.
16. **Permanency.** Permit Holders facilities that are properly installed and are in accordance with this permit will be allowed to remain in place as long as they do not adversely affect road or drain facilities in any way as determined by the Commission. Permit Holder shall alter, relocate or remove its facilities at its expense if the Commission so determines that said facilities are adversely affecting road or drain facilities in any way no matter when said adverse effect occurs or appears. Permanency does not apply to facilities permitted as temporary.

Appendix B: Submittal Checklists

Stormwater Management Review Checklist

(Completed by Applicant)

Development Name:_____ Date:_____

Location:_____

Design Engineer:_____

Address:_____

City:_____State:_____Zip:_____Telephone:_____

E-mail:_____

****For HCDC Staff****

Review Engineer:_____

Preliminary Plat Review (Plat, Condominium, Site Condominium Projects Only)

	Required Documents	Provided	Comments
1.	Completed Permit Application	☐	
2.	Review Fee	☐	
3.	Preliminary Construction Plans; (1) electronic PDF copy and (1) full size hard copy	☐	
Preliminary Construction Plans Must Include the Following:			
4.	Development Name	☐	
5.	Location Map	☐	
6.	Development Boundary	☐	
7.	Existing contours and available soil data	☐	
8.	All existing drainage courses and infrastructure on the property or	☐	

	bordering the property		
9.	Floodplain or wetland areas	☐	
10.	Proposed location of detention facilities and stormwater outlet	☐	
11.	Preliminary grading plan (if known)	☐	
12	Preliminary watershed of detention facilities, including any offsite lands that contribute.	☐	

Construction Plan Review (All Projects)

	Required Documents	Provided	Comments
1.	Completed Permit Application	☐	
2.	Review Fee	☐	
3.	Construction Plans & Stormwater Calculations; (1) electronic PDF copy and (1) full size hard copy	☐	
4.	Watershed / Catchment Figure	☐	
5.	Geotechnical Investigation or Soils Information	☐	
Construction plans Must Include the Following:			
6.	Development Name	☐	
7.	Location Map	☐	
8.	Plan Revision Date	☐	
9.	North Arrow and Scale	☐	
10.	Legend	☐	
11.	Development Boundary	☐	
12.	Lot Dimensions	☐	
13.	Lot Numbers	☐	
14.	Building Setbacks	☐	
15.	Existing roads (name, right-of-way width, public or private)	☐	
16.	Proposed roads (name, right-of-way width, public or private)	☐	
17.	Existing contours and proposed contours	☐	
18.	Available Soils Data, Soil Boring Logs, and Boring Locations	☐	
19.	Watershed map; including any offsite	☐	

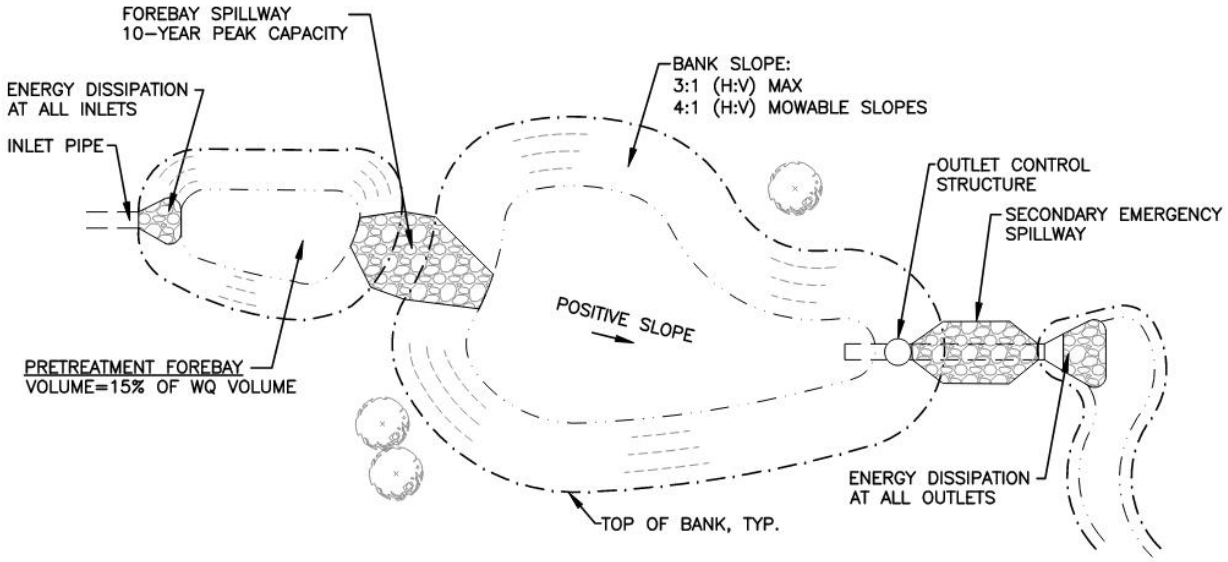
	drainage and total acreage.		
20.	Label and document all existing drainage courses and structures, including type, size, and invert elevations.	☐	
21.	County drains (may require a Drain Permit if performing work in Drain Easement)	☐	
22.	Existing floodplain and wetland areas. If wetlands are regulated by EGLE, a wetland delineation is required. When required, provide a copy of the completed EGLE permit to HCDC for project records.	☐	
23.	Specify the location and outlet of the stormwater detention facility.	☐	
24.	Existing and Proposed Easements (with dimensions, utility, and drain easements)	☐	
25.	Overland Floodways a) Provided for all yard basins b) Critical elevations shown on grading plan and profile c) Provide capacity calculations d) Place affected MBO 1 foot above established critical elevation	☐	
26.	Soil Erosion and Sedimentation Controls	☐	
27.	Minimum Building Openings (show for all lots)	☐	
Storm Water Calculations			
28.	Pipe Sizing Calculations	☐	
29.	Required water quality, channel protection, and detention volume calculations	☐	
30.	Storage Volume Provided. Table with elevations, contour areas, and cumulative volume provided drawdown.	☐	
31.	Outlet orifice calculations to demonstrate compliance with water quality, channel protection, and maximum allowable release rate	☐	

	requirements.		
32.	Spillway capacity calculations primary spillway, secondary spillway, and other overland flood routes.	☐	

Final Plan Review (All Projects)

	Required Documents	Provided	Comments
1.	Payment of any outstanding fees	☐	
2.	Engineer's Certificate of Construction	☐	
3.	As-built Construction Plans; (1) electronic PDF copy and (1) full size hard copy	☐	
4.	Final restrictive covenants/master deed (if applicable)	☐	
5.	Block grading plan (if applicable)	☐	
As-built Plans Must Include the Following:			
6.	As-built location of all drainage structures and overland swales.	☐	
7.	Final volume of all detention and retention facilities. Design engineer must confirm as-built volume provided meets or exceeds the required volume.	☐	
8.	As-built pipe inverts, lengths, slopes, materials, structure rim elevations, top of basin elevation and spillway elevations.	☐	

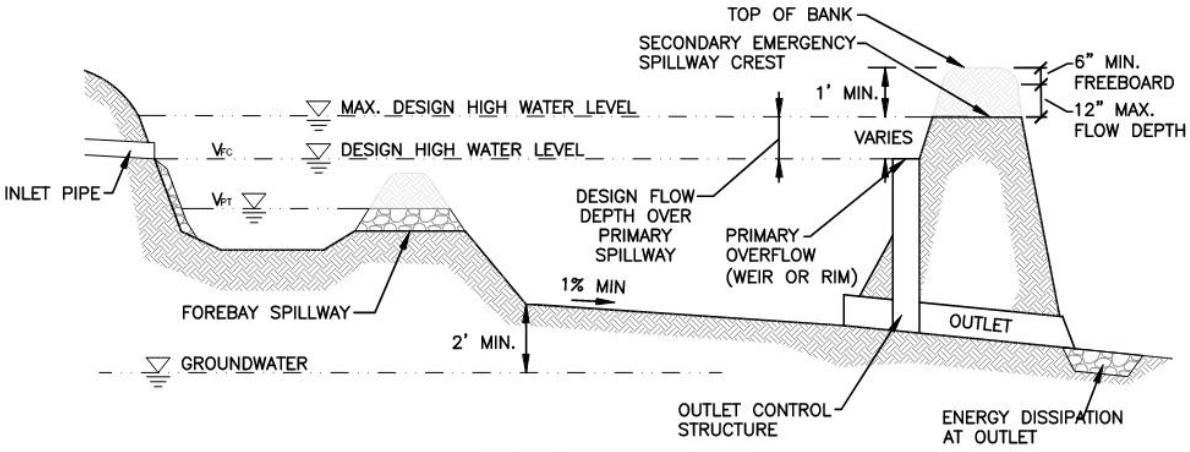
Appendix C:
Detention Basin and Retention Basin Details



PLAN VIEW

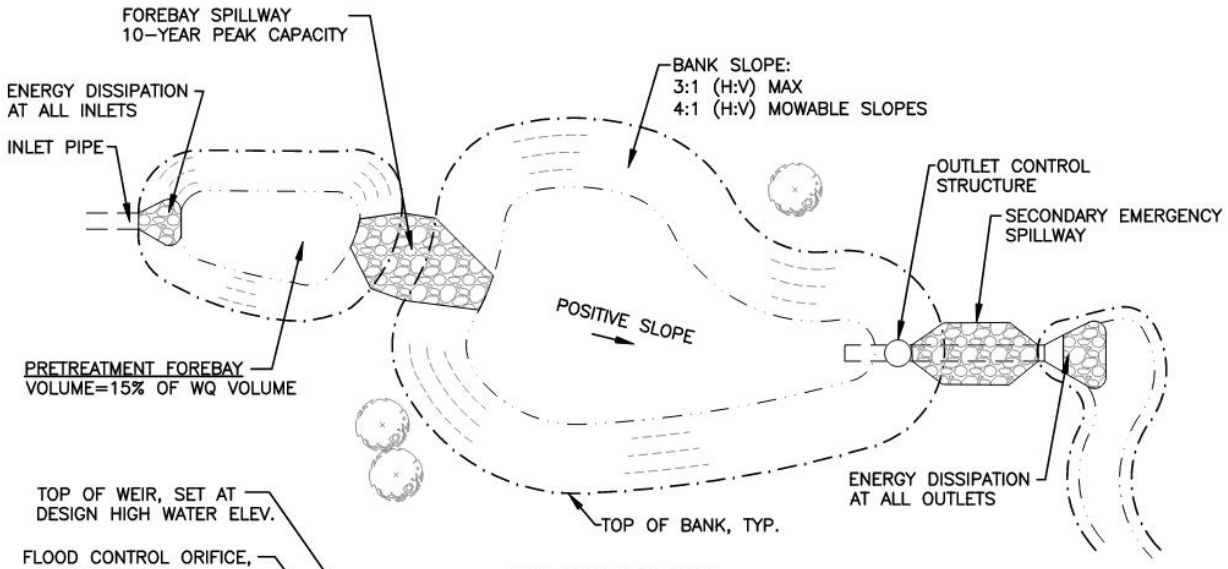
DRY DETENTION BASIN DETAIL

N.T.S.

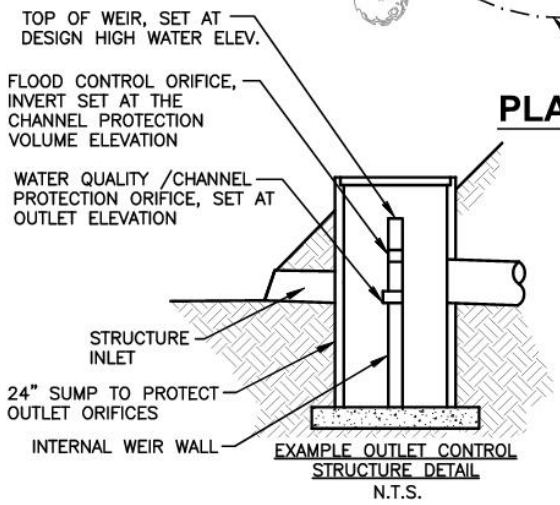


PROFILE VIEW

NOTE: THE DESIGN AND CONFIGURATION OF THE OUTLET CONTROL STRUCTURE WILL VARY FOR EACH DEVELOPMENT.

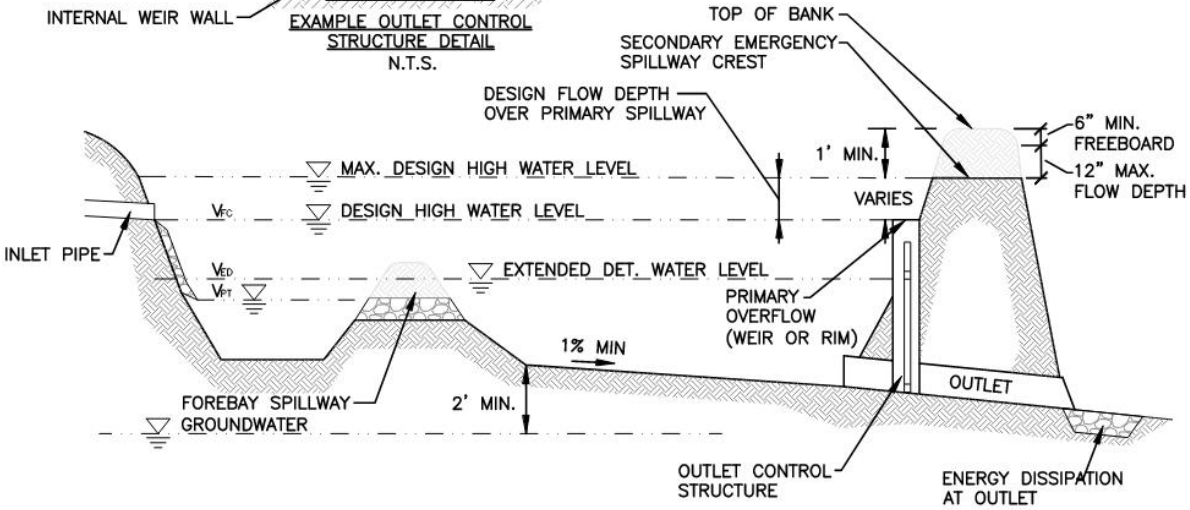


PLAN VIEW



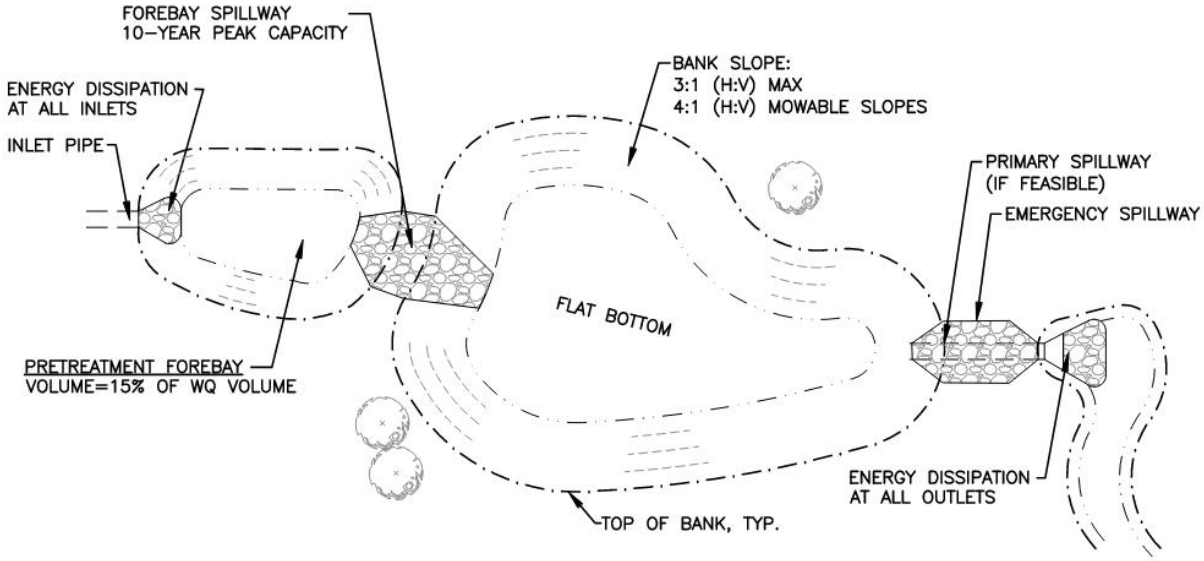
DRY EXTENDED DETENTION BASIN DETAIL

N.T.S.



PROFILE VIEW

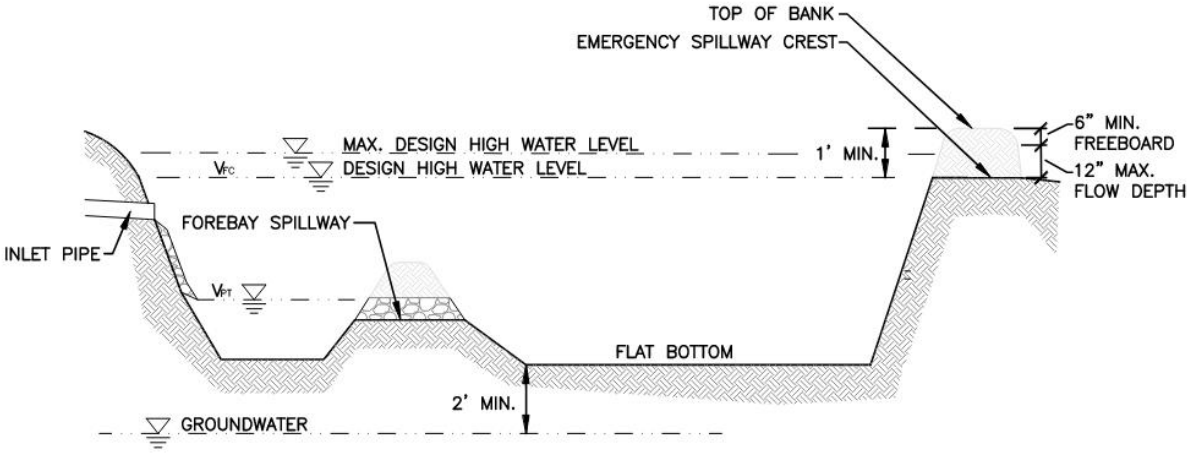
NOTE: THE DESIGN AND CONFIGURATION OF THE OUTLET CONTROL STRUCTURE WILL VARY FOR EACH DEVELOPMENT.



PLAN VIEW

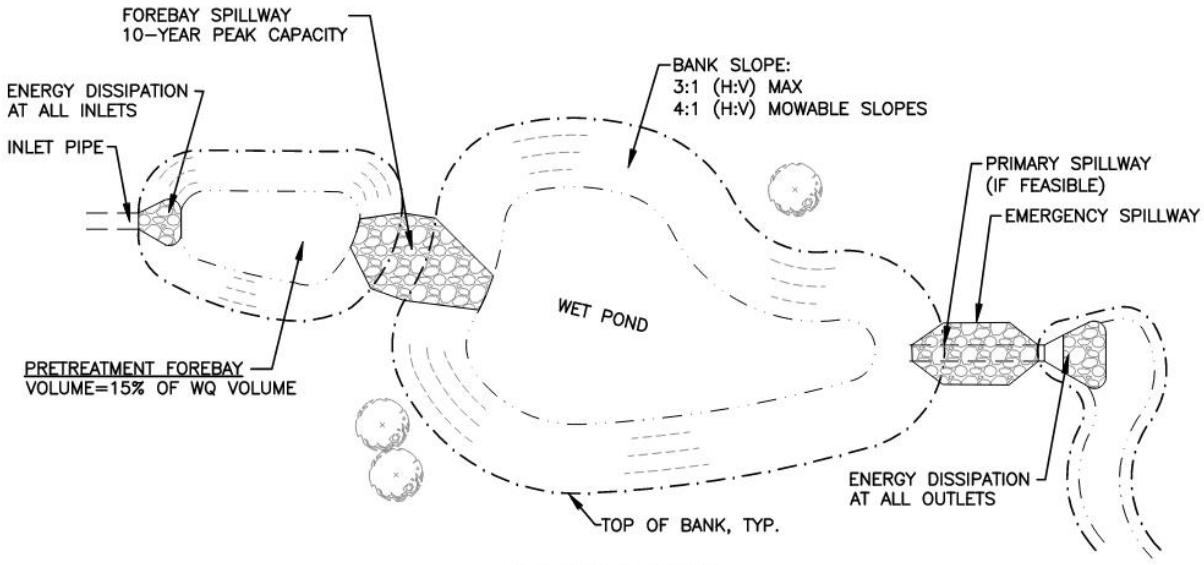
DRY RETENTION BASIN DETAIL

N.T.S.



PROFILE VIEW

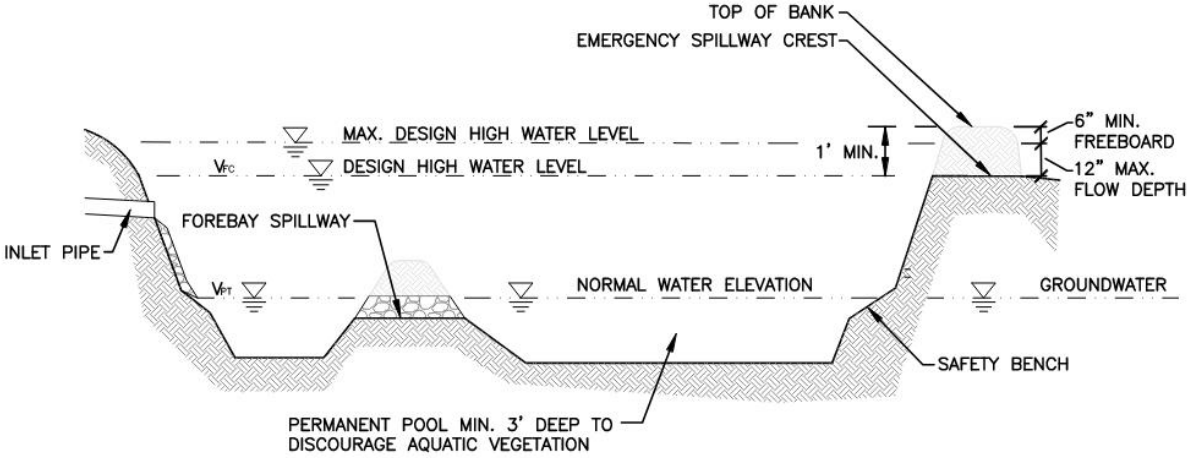
NOTE: THE INFILTRATION AREA SHALL BE DEFINED AS THE BOTTOM OF THE BASIN.



PLAN VIEW

WET RETENTION BASIN DETAIL

N.T.S.



PROFILE VIEW

NOTE: THE INFILTRATION AREA SHALL BE DEFINED AS THE HORIZONTAL PROJECTION OF THE SIDE SLOPES UP TO HALF OF THE DESIGN WATER DEPTH ABOVE A PERMANENT POOL.