VR FF Draft

TOWNSHIP OF MOUNT PLEASANT
ORDINANCE NO. 143

AN ORDINANCE OF THE TOWNSHIP OF MT. PLEASANT CREATING THE "MT. PLEASANT TOWNSHIP STORMWATER MANAGEMENT ORDINANCE; SAID ORDINANCE PROVIDES FOR PERFORMANCE STANDARDS FOR STORMWATER MANAGEMENT IN MT. PLEASANT TOWNSHIP SAID ORDINANCE ALSO PROVIDES FOR APPROPRIATE STORMWATER CONTROL METHODS, INCLUDING DESIGN STANDARDS, CRITERIA FOR INFILTRATION SYSTEMS, STORMWATER DETENTION FACILITIES, SHARED STORAGE FACILITIES AND CRITERIA FOR CONVEYANCE/COLLECTION FACILITIES. SAID ORDINANCE FURTHER PROVIDES FOR PLANNING REQUIREMENTS INCLUDING, BUT NOT LIMITED TO, GENERAL PLAN INFORMATION, MAPS OF THE PROJECT AREA, STORMWATER MANAGEMENT CONTROL, MAINTENANCE PROGRAMS AND PRIORITIES FOR FACILITY OWNERSHIP AND MAINTENANCE. SAID ORDINANCE FURTHER PROVIDES FOR THE INSPECTION AND CERTIFICATION OF THE INSTALLATION OF SAID IMPROVEMENTS INCLUDING REQUIREMENTS FOR AS-BUILT DRAWINGS, PAYMENT OF FEES AND EXPENSES; FINANCIAL GUARANTEES AND MAINTENANCE BY BOTH A PUBLIC OR PRIVATE ENTITY AND FOR THE MAINTENANCE BY INDIVIDUAL LOT OWNERS. SAID ORDINANCE FURTHER PROVIDES THAT THE VIOLATIONS OF THE ORDINANCE SHALL BE DEEMED NUISANCES, WHICH MAY BE RECOVERABLE BY A SUMMARY OFFENSE WITH A PENALTY OF NOT MORE THAN $1,000.00 PLUS COSTS FOR VIOLATION OF THE PROVISIONS OF THE ORDINANCE.

ARTICLE I – GENERAL PROVISIONS

Section 101. Short Title

This Ordinance shall be known and may be cited as the "Mount Pleasant Township Stormwater Management Ordinance".

Section 102. Statement of Findings

The governing body of the Municipality finds that:

A. Stormwater runoff from lands modified by human activities threatens public health and safety by causing decreased infiltration of rainwater and increased runoff flows and velocities, which overtax the carrying capacity of existing

streams and storm sewers, and greatly increases the cost to the public to manage stormwater.

B. Inadequate planning and management of stormwater runoff resulting from land development and redevelopment throughout a watershed can also harm surface water resources by changing the natural hydrologic patterns, accelerating stream flows (which increase scour and erosion of stream-beds and stream-banks thereby elevating sedimentation), destroying aquatic habitat and elevating aquatic pollutant concentrations and loading such as sediments, nutrients, heavy metals and pathogens. Groundwater resources are also impacted through loss of recharge.

C. A program of stormwater management, including reasonable regulation of land development and redevelopment causing loss of natural infiltration, is fundamental to the public health, safety, welfare, and the protection of the people of the Municipality and all the people of the Commonwealth, their resources, and the environment.

D. Stormwater can be an important water resource by providing groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.

E. Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater.

F. Federal and state regulations require certain municipalities to implement a program of stormwater controls. These municipalities are required to obtain a permit for stormwater discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES).

G. Non-stormwater discharges to municipal separate storm sewer systems can contribute to pollution of waters of the Commonwealth by the Municipality.

Section 103. Purpose

The purpose of this Ordinance is to promote health, safety, and welfare within the Municipality and its watershed by minimizing the harms and maximizing the benefits described in Section 102 of this Ordinance, through provisions designed to:

A. Manage stormwater runoff impacts at their source by regulating activities that cause the problems.

B. Provide review procedures and performance standards for stormwater planning and management.

C. Utilize and preserve the existing natural drainage systems as much as possible.

D. Manage stormwater impacts close to the runoff source, which requires a minimum of structures and relies on natural processes.

E. Focus on infiltration of stormwater, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality and to otherwise protect water resources.

F. Maintain existing flows and quality of streams and watercourses.

G. Meet legal water quality requirements under state law, including regulations at 25 Pa. Code Chapter 93.4a to protect and maintain "existing uses" and maintain the level of water quality to support those uses in all streams, and to protect and maintain water quality in "special protection" streams.

H. Prevent scour and erosion of streambanks and streambeds.

I. Provide for proper operations and maintenance of all permanent stormwater management BMP's that are implemented in the Municipality.

J. Provide a mechanism to identify controls necessary to meet the NPDES permit requirements.

K. Implement an illegal discharge detection and elimination program to address non-stormwater discharges into the Municipality's separate storm sewer system.

Section 104. Statutory Authority

The Municipality is empowered to regulate land use activities that affect stormwater impacts by the authority of the 53 P.S. § 67701 *et. seq* of the Second Class Township Code of the Commonwealth of Pennsylvania.

Section 105. Applicability

A. This Ordinance applies to any Regulated Earth Disturbance activities within the Municipality, and all stormwater runoff entering into the Municipality's separate storm sewer system from lands within the boundaries of the Municipality.

B. Earth Disturbance activities and associated stormwater management controls are also regulated under existing state law and implementing regulations. This Ordinance shall operate in coordination with those parallel requirements; the requirements of this Ordinance shall be no less restrictive in meeting the purposes of this Ordinance than state law.

Section 106. Repealer

Any other ordinance provision(s) or regulation of the Municipality inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency

only.

Section 107. Severability

In the event that any section or provision of this Ordinance is declared invalid by a court of competent jurisdiction, such decision shall not affect the validity of any of the remaining provisions of this Ordinance.

Section 108. Compatibility with Other Requirements

A. Approvals issued and actions taken under this Ordinance do not relieve the Applicant of the responsibility to secure required permits or approvals for activities regulated by any other code, law, regulation or ordinance. To the extent that this Ordinance imposes more rigorous or stringent requirements for stormwater management, the specific requirements contained in this Ordinance shall be followed.

B. Nothing in this Ordinance shall be construed to affect any of the Municipality's requirements regarding stormwater matters which do not conflict with the provisions of this Ordinance, such as local stormwater management design criteria (e.g. inlet spacing, inlet type, collection system design and details, outlet structure design, etc.). Conflicting provisions in other municipal ordinances or regulations shall be construed to retain the requirements of this ordinance addressing State Water Quality Requirements.

ARTICLE II – DEFINITIONS

For the purposes of this Ordinance, certain terms and words used herein shall be interpreted as follows:

A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.

B. The word "includes" or "including" shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.

C. The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.

D. The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, or any other similar entity.

E. The words "used or occupied" include the words "intended, designed, maintained, or arranged to be used, occupied or maintained".

Accelerated Erosion – The removal of the surface of the land through the combined action of human activities and the natural processes, at a rate greater than would occur because of the natural process alone.

Alteration – As applied to land, a change in topography as a result of the moving of soil and rock from one location or position to another; the changing of surface conditions by causing the surface to be more or less impervious; or earth disturbance activity.

Applicant – A landowner, developer or other person who has filed an application for approval to engage in any Regulated Earth Disturbance activity at a project site in the Municipality.

BMP (Best Management Practice) – Activities, facilities, designs, measures or procedures used to manage stormwater impacts from Regulated Earth Disturbance activities, to meet State Water Quality Requirements, to promote groundwater recharge and to otherwise meet the purposes of this Ordinance. BMP's include but are not limited to infiltration, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, forested buffers, sand filters and detention basins.

Conservation District – The Westmoreland Conservation District.

DEP – The Pennsylvania Department of Environmental Protection.

Developer – A person that seeks to undertake any Regulated Earth Disturbance activities at a project site in the Municipality.

Development – See "Earth Disturbance Activity." The term includes redevelopment.

Development Site – The specific tract of land where any Earth Disturbance activities in the Municipality are planned, conducted or maintained.

Earth Disturbance Activity – A construction or other human activity which disturbs the surface of the land, including, but not limited to, clearing and grubbing, grading, excavations, embankments, road maintenance, building construction and the moving, depositing, stockpiling, or storing of soil, rock or earth materials, other than activity which occurs during the normally practiced course of farming operations.

Erosion – The process by which the surface of the land, including channels, is worn away by water, wind, or chemical action.

Erosion and Sediment Control Plan – A plan for a project site which identifies BMP's to minimize accelerated erosion and sedimentation.

Groundwater Recharge – Replenishment of existing natural underground water supplies.

Impervious Surface – A surface that prevents the infiltration of water into the ground. Impervious surface includes, but is not limited to, any roof, parking or driveway areas, and any new streets and sidewalks. Any surface areas designed to initially be gravel or crushed stone shall be assumed to be impervious surfaces.

Municipality – Mt. Pleasant Township, Westmoreland County, Pennsylvania.

Municipal Separate Storm Sewer System (MS4) – A separate storm sewer (including roads
with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains), which include, but is not limited to the following:

1. A system owned or operated by a state, city, town, borough, township, county district, association, authority, or any other public body created under state law having jurisdiction over the disposal of sewage, industrial wastes, storm water or other wastes;

2. A system designed or used for collecting or conveying storm water;

3. A system which is not a combined sewer; and/or

4. A system which is not a part of a Publicly Owned Treatment Works. (NPDES Permit Mod.)

NOI – The Notice of Intent for Coverage under the NPDES General Permit for discharges from Small Municipal Separate Storm Sewer Systems (NPDES Permit Mod.)

NPDES – National Pollutant Discharge Elimination System, the federal government's system for issuance of permits under the Clean Water Act, which is delegated to DEP in Pennsylvania.

Outfall – "Point source" as described in 40 CFR § 122.2 at the point where the Municipality's storm sewer system discharges to surface waters of the Commonwealth or where an MS4 discharges into those surface waters of the Commonwealth; "outfall" does not include open conveyances connecting two (2) municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other surface waters which are used to convey surface waters. (NPDES Permit Mod.)

PA DEP - The Pennsylvania Department of Environmental Protection.

Person – An individual, partnership, public or private association or corporation, or a

governmental unit, public utility or any other legal entity whatsoever which is recognized by law as the subject of rights and duties.

Point Source – Any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, or conduit from which stormwater is or may be discharged, as defined in State regulations at 25 Pa. Code § 92.1.

Project Site – The specific area of land where any Regulated Earth Disturbance activities in the Municipality are planned, conducted or maintained.

Redevelopment – Earth Disturbance activities on land which has previously been disturbed or developed.

Regulated Earth Disturbance Activity – Those construction activities which result in land disturbance of greater than one (1) acre or more and/or land disturbance on a development site of less than one (1) acre where such development site is part of a larger common plan of development or sale that equals one (1) acre or more. (NPDES Permit Mod.) Provided, however, that any construction activities associated with commercial, industrial, institutional or other business related purposes shall be deemed Regulated Earth Disturbance Activity regardless of the size of the area of disturbance.

Road Maintenance – Earth disturbance activities within the existing road cross – section, such as grading and repairing existing unpaved road surfaces, cutting road banks, cleaning or clearing drainage ditches and other similar activities.

Separate Storm Sewer System – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man made channels or storm drains) primarily used for collecting and conveying stormwater runoff.

Small Municipal Separate Storm Sewer System – A municipal separate storm sewer system (MS4):

1. Designated by the EPA at pages 68828-68831 of the Federal Register Volume 64, number 235 (December 8, 1999) based on the 1990 Decennial Census;

2. Designated by the EPA based on the 2000 Decennial Census:

3. Designated by the DEP Based on the process described in 40 CFR § 123.35 unless waived by the DEP pursuant to the process described in 40 CFR §123.35. (NPDES Permit Mod.)

State Water Quality Requirements – As defined under state regulations – protection of designated and existing uses (See 25 Pa. Code Chapters 93 and 96) – including:

A. Each stream segment in Pennsylvania has a "designated use," such as "cold water fishery" or "potable water supply," which are listed in Chapter 93. These uses must be protected and maintained, under state regulations.

B. "Existing uses" are those attained as of November 1975, regardless whether they have been designated in Chapter 93. Regulated Earth Disturbance activities must be designed to protect and maintain existing uses and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in special protection streams.

C. Water quality involves the chemical, biological and physical characteristics of surface water bodies. After Regulated Earth Disturbance activities are complete, these characteristics can be impacted by addition of pollutants such as sediment, and changes in habitat through increased flow volumes and/or rates as a result of changes in land surface are from those activities. Therefore, permanent discharges to surface waters must be managed to protect the stream bank, streambed and structural integrity of the waterway, to prevent these impacts.

Stormwater – Runoff from precipitation, snowmelt runoff, surface runoff and drainage. (NPDES Permit Mod.)

Surface Waters of the Commonwealth – Any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

Watercourse – A channel or conveyance of surface water, such as a stream or creek, having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

Watershed – Region or area drained by a river, watercourse or other body of water, whether natural or artificial.

ARTICLE III – STORMWATER MANAGEMENT FOR WATER QUALITY

Section 301. General Requirements for Stormwater Management

A. All Regulated Earth Disturbance activities within the Municipality shall be designed, implemented, operated and maintained to meet the purposes of this Ordinance, through these two elements:

1. Erosion and Sediment control during the earth disturbance activities (e.g., during construction), and

2. Water quality protection measures after completion of earth disturbance activities (e.g., after construction), including operations and maintenance.

B. No Regulated Earth Disturbance activities within the Municipality shall commence until the requirements of this Ordinance are met.

C. Erosion and sediment control during Regulated Earth Disturbance activities shall be addressed as required by Section 303.

D. Post-construction water quality protection shall be addressed as required by Section 304. Operations and maintenance of permanent stormwater BMPs shall be addressed as required by Article IV.

E. All Best Management Practices (BMPs) used to meet the requirements of this Ordinance shall conform to the State Water Quality Requirements, and any more stringent requirements as determined by the Municipality.

F. Techniques described in Appendix A (Low Impact Development) of this Ordinance are encouraged, because they reduce the costs of complying with the requirements of this Ordinance and the State Water Quality Requirements.

G. Prohibited discharges and connections as defined in Article VII of this Ordinance shall not be made to Municipality's storm sewer system.

Section 302. Permit Requirement by Other Government Entities

The following permit requirements may apply to certain Regulated Earth Disturbance activities, and must be met prior to commencement of Regulated Earth Disturbance activities, as applicable:

A. All Regulated Earth Disturbance activities subject to permit requirements by DEP under regulations at 25 Pa. Code Chapter 102.

B. Work within natural drainage ways subject to permit by DEP under 25 Pa. Code Chapter 105.

C. Any stormwater management facility that would be located in or adjacent to surface waters of the Commonwealth, including wetlands, subject to permit by DEP under 25 Pa. Code Chapter 105.

D. Any stormwater management facility that would be located on a State highway right-of-way, or require access from a state highway, shall be subject to approval by the Pennsylvania Department of Transportation (PENNDOT).

E. Culverts, bridges, storm sewers or any other facilities which must pass or convey flows from the tributary area and any facility which may constitute a dam subject to permit by DEP under 25 Pa. Code Chapter 105.

Section 303. Erosion and Sediment Control During Regulated Earth Disturbance Activities

A. No Regulated Earth Disturbance activities within the Municipality shall commence until an approval has been received from the Westmoreland Conservation District of an Erosion and Sediment control Plan for construction activities.

B. DEP has regulations that require an Erosion and Sediment Control Plan for any earth disturbance activity of 5,000 square feet or more, under 25 Pa. Code § 102.4(b).

C. In addition, under 25 Pa. Code Chapter 92, a DEP "NPDES Construction Activities" permit is required for Regulated Earth Disturbance activities.

D. The BMP's shall be identified in a plan, and a permit if applicable, as required by PADEP Regulations at 25 Pa. Code Chapter 102.

E. Evidence of any necessary permit(s) for Regulated Earth Disturbance activities from the appropriate DEP regional office or County Conservation District must be provided to the Municipality.

F. A copy of the Erosion and Sediment Control plan and any required permit, as required by DEP regulations, shall be available at the project site at all times.

Section 304. Water Quality Requirements After Regulated Earth Disturbance Activities.

A. No Regulated Earth Disturbance activities within the Municipality shall commence until approval by the Municipality of a plan which demonstrates compliance with State Water Quality Requirements after construction is complete.

B. The BMPs must be designed, implemented and maintained to meet State Water Quality Requirements, and any other more stringent requirements as determined by the Municipality.

C. To control post – construction stormwater impacts from Regulated Earth Disturbance activities, State Water Quality Requirements can be met by BMPs, including site design, which provide for replication of pre-construction stormwater infiltration and runoff conditions, so that post – construction stormwater discharges do not degrade the physical, chemical or biological characteristics of the receiving waters. As described in the DEP Comprehensive Stormwater Management Policy (#391-0300-002, September 28, 2002), this may be achieved by the following:

1. Infiltration: replication of pre-construction stormwater infiltration conditions,

2. Treatment: use of water quality treatment BMPs to ensure filtering out of the chemical and physical pollutants from the stormwater runoff, and

3. Streambank and Streambed Protection: management of volume and rate of post-construction stormwater discharges to prevent physical degradation of receiving waters (e.g., from souring).

D. DEP has regulations that require municipalities to ensure design, implementation and maintenance of Best Management Practices ("BMPs") that control runoff from new development and redevelopment after Regulated Earth Disturbance activities are complete. These requirements include the need to implement post-construction stormwater BMPs with assurance of long-term operations and maintenance of those BMPs.

E. Evidence of any necessary permit(s) for Regulated Earth Disturbance activities from the appropriate DEP regional office must be provided to the Municipality. The issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit (PAG-2)) satisfies the requirements of subsection 304.A.

F. BMP operations and maintenance requirements are described in Article IV of this Ordinance.

ARTICLE IV – STORMWATER QUANITY MANAGEMENT

Section 401. Purpose

The purpose of the following Sections is to limit and restrict stormwater runoff peak flows from subdivisions and other land development to predevelopment flow Rates as indicated herein.

Section 402. Applicability

A. The Following activities are included within the scope of this chapter:

1. Land developments, including, without limitation, all commercial, industrial and institutional development regardless of size and whether or not such development is considered new or as an addition to existing, commercial, industrial or institutional development. Development of individual residential lots that predate this Ordinance shall be exempt from the provisions of this Ordinance.

2. All subdivisions consisting of our (4) or more lots, regardless of the overall size of the development. The Enumeration of lots shall include the residual tract. Provided however that if a tract of ground or land is subdivided, containing less than four (4) lots and said tract is subdivided in the future, the original number of lots in

the initial subdivision shall be considered when future subdivisions are filed. *i.e. a tract of ground is subdivided into two (2) lots and a residual tract and then; and, then, the residual tract is subdivided into another lot plus the residual tract, the total lots will consist of four (4) lots and the provisions of this article shall apply.*

3. Construction of new or additional impervious or semipervious surfaces (driveways, roadways, parking lots, buildings and additions thereto) which increases the rate of runoff equal to or more than thirty-hundredths (0.30) cubic feet per seconds (cfs) as calculated using the Rational Formula for a ten-year storm.

4. Earthmoving activity involving one (1) or more acre of land.

B. Normal agricultural and farming uses shall be exempt from the operation of this Ordinance.

Section 403. Compliance with other provisions.

Permits and approvals issued pursuant to this chapter do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act, ordinance, or regulatory agency. If more stringent requirements concerning regulation or stormwater control are contained in the other code, rule, or ordinance, the more stringent regulations shall apply.

Section 404. Definitions

The following terms, whenever used in this Ordinance hereafter shall have the meanings indicated in this section, except where the context indicates a different meaning.

Conservation District — The Westmoreland County Conservation District.

Culvert — A pipe, conduit or similar structure, including appurtenant works, which carries surface water.

Designee — Unless otherwise noted, the official designee of Mt. Pleasant Township for action on behalf of the Township under the terms of this chapter shall be the Mt. Pleasant Township Engineer.

Design Storm — The magnitude of the precipitation from a storm

event measured in probability of occurrence (e.g., one-hundred year storm) and duration (e.g., twenty-four hour) and used in computing storm water management control systems.

Detention Basin — A basin designed to detain storm water runoff by Having a controlled discharge system.

Developer — Any landowner, agent of such landowner or tenant with the permission of such landowner who makes or causes to be made a subdivision of land or a land development as described in this Ordinance.

Drainage Easement — A right granted by a landowner to a grantee permitting the use of private land. for storm water management purposes.

Hydraulic Grade — Line A line joining points whose vertical distance from the center of the cross section of the fluid flowing a pipe is proportional to the pressure in the pipe at the point.

Hydraulic Gradient — The slope of the hydraulic grade line.

Impervious Surface — A surface which retards the percolation of water into the ground, e.g., asphalt, concrete and roofs.

Land Development — Any of the following activities:

1. The improvement of one (1) lot or two (2) or more contiguous lots, tracts, or parcels of land for any purpose involving a group of two (2) or more residential or nonresidential buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots, regardless of the number of occupants, or tenure; or the division or allocation of land or space, whether initially. or cumulatively, between or among two (2) or more existing or prospective occupants by means of, or for the purpose of, streets, common areas, leaseholds, condominiums, building groups or other features.

2. A subdivision of land.

Land Disturbance Activity — Any nonagricultural grading, earthwork, site preparation or construction activity which alters the vegetative cover, land contours or drainage patterns. *Disturbance Activity, for purposes of this Chapter shall be deemed to be those construction activities which result in land disturbance of greater than one* (1) *acre or more and/or land disturbance on a*

development site of less than one (1) *acre where such development site is part of a larger common plan of development or sale that equals one* (I) *acre or more. Provided, "however, that any construction activities associated with commercial, industrial, institutional or other business related purposes shall be deemed Land Disturbance Activity regardless of the size of the area of disturbance.*

Municipality Mt. Pleasant Township, Westmoreland County, Pennsylvania.

Peak Discharge The maximum rate of flow of water at a given point and time resulting from a specified storm event.

Private Entity A partnership, corporation, homeowner's association, condominium association or any other similar associations as distinguished from an individual lot owner.

Rational Formula A rainfall to runoff relation used to estimate peak flow, expressed by the following formula:

Q=CIA

Where:

Q =Peak runoff rate in cubic feet per second (cfs)
C =Runoff coefficient
I =Design rainfall intensity (inches per hour)
A =Drainage area in acres.

Recurrence Interval The average interval of time, stated in years, within which a given storm event will be equaled or exceeded once.

Retention Basin A basin designed to retard storm water runoff by having a controlled discharge system.

Runoff That part of precipitation, which flows over the land.

SCS Soil Conservation Service, Untied States Department of Agriculture.

Semipervious Surface A surface such as stone, rock or other materials

which permits some vertical transmission of water.

Soil Cover Complex Method A method of runoff computation developed by SCS and found in its publication Urban Hydrology for Small Watersheds, Technical Release No. 55, SCS, January, 1975, Revised 1986.

Storm Sewer A system of pipes or conduits which carries intercepted surface runoff, street water or drainage but excludes domestic sewage and industrial wastes.

Stormwater Management Plan The guidelines for managing stormwater runoff in accordance with the provisions of this Ordinance.

Stormwater Structures Basins, pipes, swales, terraces, etc., designed and installed to collect, transport, detain and/or retain stormwater.

Subdivision The division or redivision of a lot, tract or parcel of land by any means into two (2) or more lots, tracts, parcels, or other divisions of land, including changes in existing to lines for the purpose, whether immediate or future, of lease, partition by the Court for distribution to heirs or devisees, transfer of ownership or building or lot development; provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than ten (10) acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

Swale A low-lying stretch of land which gathers or Carries surface water runoff.

Time of Concentration (Tc) The time, in hours, that surface stormwater runoff takes to travel from the hydraulically most distant point in the drainage basin to the point under design consideration.

Section 405. General Provisions.

A. Basis of calculations. Computations for determining storm water runoff and discharge for the design of storm water management facilities shall be based upon the methods described in TR-55, Urban Hydrology for Small Watersheds, or other

method acceptable to the Township designee, excepting that the Rational Method may be used when the Tc is less than on-tenth (0.1) hours.

B. Recurrence interval (storm frequency data). The rainfall shall be determined the United States Weather Service T.P. 40, for use with TR-55, or the National Oceanic and Atmospheric Administration Technical Memorandum NWS HYDRO-35, for use with the Rational Formula, or other valid data as deemed suitable by the Township.

C. Storm water runoff volumes; Storm water runoff shall be based on the following twenty-four-hour storm events or other valid data as deemed suitable by the township:

Recurrence Interval (YEARS)	Storm Volume (inches of rainfall)
2	2.7
10	4.0
25	4.6
50	5.0
100	5.4

D. Storm duration. For use with TR-55 the storm rainfall shall have a twenty-four hour duration with a SCS Type II time distribution. For use with the Rational Formula, the rainfall duration shall equal the watershed Tc.

E. Maintenance of natural drainage ways. All natura1 streams, channels, swales, drainage systems and/or areas of surface water concentration shall be maintained in their existing condition unless an exception is approved by Mt. Pleasant Township or official.

representative thereof. All encroachment activities shall comply with Chapter 105, Water. Obstructions and Encroachments, of Title 25 of the Rules and Regulations of the Pennsylvania Department of Environmental Protection.

F. Method of stormwater runoff detention and control.

1. The following is a list of detention and control methods suitable for use in stormwater management systems. The selection of control methods is not limited to the ones present on this list:

a. Detention an/or retention structures
b. Grass channels and vegetated strips
c. Routed flow over grass
d. Decreased impervious areas coverage

e. Porous pavement and concrete lattice block surface
f. Cisterns and underground reservoirs including piping systems
g. Rooftop storage.
h. Parking lot and street ponding

2. The Township, however, reserves the right to approve or deny any or all of the above control methods as to any individual project. Certain other control methods which meet the criteria of this subsection will be permitted when approved by the township or an official representative thereof.

ARTICLE V - SYSTEM DESIGN

Section 501. Design Criteria.

A. Total system requirements. All pre-development calculations shall be based upon existing land use features. Agricultural lands shall be considered as using . conservation treatment or in good condition regardless of the current condition.

1. Release rates from subdivisions or land developments shall be based on the runoffs calculated pursuant to recurrence intervals a set forth in Section-above.

2. Storage structures discharge rate will not exceed fifty (50%) percent of the pre-development discharge rate for any storm event.

3. All storage structures or facilities will be designed with emergency spillways sufficient to handle the one-hundred-year post-development storm event less flow through the primary spillway.

4. Culverts, pipes and other water-carrying structures shall be designed to handle the peak discharge from the ten-year post-development storm event. All pipes shall be provided with an end sections or end wall. Refer to Plate A.

B. Storm water inlets. The maximum spacing between storm water inlets shall be designed according to the ten-year storm flow and the capacity of the inlets, taking into account gradient of roadway, maximum allowable street flooding opening or combination inlets exists, use the capacity reduction factors shown in Table I applied to theoretical capacity of the inlet. The maximum amount of water that should be bypassed on to the next downstream inlet for inlets on continuous grades is ten percent (10%).

C. Pipes. The minimum allowable pipe diameter shall be fifteen (15) inches unless approved by the Township or the Township's representative. Horizontal and

vertical curves with radii of one hundred (100) feet or greater are allowed for all pipe sizes.

D. Spacing of structures. The maximum allowable spacing between structures to be used for inspecting and cleaning storm sewers shall be based on the pipe size and spacing shown in Table2.

E. Open channels. Maximum allowable velocities of flow in swales, open channels and ditches as relating in slope and grass cover as are set forth in the DEP Best Management Practices Manual.

F. Spillway design. The outlets for the retention ponds shall consist of a combination of principal and emergency spillways. The outlets must pass the peak runoff expected from the drainage area for one-hundred-year storm without damage to the embankment of the pond.

G. Principal spillway. The principal spillway shall consist of a solid vertical pipe or concrete box joined by a watertight connection to a horizontal pipe (barrel) extending through the embankment and out-letting beyond the downstream toe of the fill. The principal spillway shall have a minimum capacity of two-tenth (0.2) cfs per acre of drainage area when the water surface is at the crest of the emergency spillway. The maximum capacity of the barrel will be the twenty-five year pre-development flow. The construction materials must be approved by the Township. (Refer to Plate A attached hereto and incorporated herein).

H. Design elevations. The crest of the principal spillway shall be a minimum of one and zero-tenths (1.0) feet below the crest of the emergency spillway. The crest of the principal spillway shall be a minimum of three (3) feet below the top of the embankment. (Refer to Plate A attached hereto and incorporated herein).

I. Anti-vortex and trash rack. An anti-vortex device and trash rack shall be attached to the top of the principal spillway to improve the flow of water into the spillway and prevent floating debris from being carried out of the basins. The anti-vortex device shall be of the concentric type as shown in Plate B and Plate C (which are attached hereto and incorporated herein) or approved equivalent.

J. Base. The base of the principal spillway must be firmly anchored to prevent its floating. If the riser of the spillway is greater than ten (10) feet in height, computations must be made to determine the anchoring requirements. As a minimum, a factor of safety of one and twenty-five hundredths (1.25) shall be used [downward forces=one and twenty-five hundredths (1.25) x upward forces]. For risers ten (10) feet or less in height, the anchoring may be done in one (I) of the two (2) following ways:

1. A concrete base eighteen (18) inches thick and twice the width of the riser diameter shall be used and the riser embedded six (6) inches into the concrete. (See Plate D attached hereto and incorporated herein, for

design details.)

2. A square steel plate, a minimum of one-fourth (1/4) inch thick and having a width equal to twice the diameter of the riser shall be welded to the base of the riser. The plate shall then be covered with two and five tenths (2.5) feet of stone, gravel or compacted soil to prevent flotation. (See Plate D attached hereto and incorporated herein, for design details).

K. Barrel. The barrel of the principal spillway, which extends through the embankment, shall be designed to carry the twenty-five year pre-development flow.

L. Anti-seep collars.

1. Anti-seep collars shall be used on the barrel of the principal spillway within the normal saturation zone of the embankment to increase the seepage length by at least ten percent (10%) if either of the following conditions is met:

   a. The settled height of the embankment exceeds ten (10) feet.

   b. The embankment has a low silt clay content and the barrel is greater than ten (10) inches in diameter.

2. Anti-seep collars shall be installed within the saturated zone. The maximum spacing between collars shall be fourteen (14) times the projection of the collar above the barrel. Collars shall not be closer than two (2) feet to a pipe joint. Connections between the collars and the barrel shall be watertight. See Plates E, F, and G for requirements and details on anti-seep collars.

M. Emergency spillway. The emergency spillway shall consist of an open channel constructed adjacent to the embankment over undisturbed material. The emergency spillway shall be designed to carry the peak rate of runoff expected from a one-hundred-year storm, less any reduction due to the flow through the principal spillway. (See Plates H and I, attached hereto and incorporated herein, for design of the emergency spillway.)

N. Embankment. The material and construction for the embankment shall meet the requirements of PA DOT Publication 408, Section 206 "Embankment".

O. Fence. A chain link fence must be installed around the pond at a height of six (6) feet. A ten-foot wide gate with lock and keys must be provided to allow access for future maintenance. Fence details and specifications shall be submitted to the Township for approval. The fence requirements are waived where detention swales are utilized for storage. The maximum water depth in swales shall not exceed 2.0 feet with an average depth of 1.0 foot.

P. Access road. The developer shall provide a ten-foot wide access road constructed of 2B stone at a depth of four (4) inches. Such access road shall run from the paved township street to the retention pond.

ARTICLE VI – STORMWATER BMP OPERATIONS AND MAINTENANCE PLAN REQUIREMENTS

Section 601. General Requirements

A. No Regulated Earth Disturbance activities within the Municipality shall commence until approval by the Municipality of BMP Operations and Maintenance plan which describes how the permanent (e.g., post-construction) stormwater BMPs will be properly operated and maintained.

B. The following items shall be included in the BMP Operations and Maintenance Plan:

1. Map(s) of the project area, in a form that meets the requirements for recording at the offices of the Recorder of Deeds of Westmoreland County. The contents of the map(s) shall include, but not be limited to:

   a. Clear identification of the location and nature of permanent stormwater BMPs,

   b. The location of the project site relative to highways, municipal boundaries or other identifiable landmarks.

   c. Existing and final contours at intervals of two feet, or others as appropriate,

   d. Existing streams, lakes, ponds, or other bodies of water within the project site area,

   e. Other physical features including flood hazard boundaries, sinkholes, streams, existing drainage courses, and areas of natural vegetation to be preserved,

   f. The locations of all existing and proposed utilities, sanitary sewers, and water lines within fifty (50) feet of property lines of the project site,

   g. Proposed final changes to the land surface and vegetative cover, including the type and amount of impervious area that would be added,

h. Proposed final structures, roads, paved areas, and buildings, and

i. A fifteen (15) foot wide access easement around all stormwater BMPs that would provide ingress to and egress from a public right-of-way.

j. A North Arrow.

2. A description of how each permanent stormwater BMP will be operated and maintained, and the identity of the person(s) responsible for operations and maintenance,

3. The name of the project site, the name and address of the owner of the property, and the name of the individual or firm preparing the Plan, and

4. A statement, signed by the landowners, acknowledging that the stormwater BMPs are fixtures that can be altered or removed only after approval by the Municipality.

Section 602. Responsibilities for Operations and Maintenance of BMPs

A. The BMP Operations and Maintenance Plan for the project site shall establish responsibilities for the continuing operation and maintenance of all permanent stormwater BMPs as follows:

1. If a Plan includes structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the Municipality, stormwater BMPs may also be dedicated to and maintained by the Municipality.

2. If a Plan includes operations and maintenance by a single ownership, or if sewers and other public improvements are to be privately owned and maintained, then the operation and maintenance of stormwater BMPs shall be the responsibility of the owner or private management entity.

B. The Municipality shall make the final determination on the continuing operations and maintenance responsibilities. The Municipality reserves the right to accept or reject the operations and maintenance responsibility for any or all of the stormwater BMPs.

Section 603. Municipality Review of BMP Operations and Maintenance Plan

A. The Municipality shall review the BMP Operations and Maintenance Plan for consistency with the purposes and requirements of this ordinance, and any permits issued by DEP.

B. The Municipality shall notify the Applicant in writing whether the BMP Operations and Maintenance Plan is approved.

C. The Municipality shall require an "As-Built Survey" of all stormwater BMPs, and an explanation of any discrepancies with the Operations and Maintenance Plan.

Section 604. Adherence to Approved BMP Operations and Maintenance Plan

It shall be unlawful to alter or remove any permanent stormwater BMP required by an approved BMP Operations and Maintenance Plan, or to allow the property to remain in a condition which does not conform to an approved BMP Operations and Maintenance Plan, unless an exception is granted in writing by the Municipality.

Section 605. Operations and Maintenance Agreement for Privately Owned Stormwater BMPs

A. The property owner shall sign an operations and maintenance agreement with the Municipality covering all stormwater BMPs that are to be privately owned. The agreement shall be substantially the same as the agreement in Appendix B of this Ordinance.

B. Other items may be included in the agreement where determined necessary to guarantee the satisfactory operation and maintenance of all permanent stormwater BMPs. The agreement shall be subject to the review and approval of the Solicitor of the Municipality.

Section 606. Stormwater Management Easements

A. Stormwater management easements are required for all areas used for off-site stormwater control, unless a waiver is granted by the Municipal Engineer.

B. Stormwater management easements shall be provided by the property owner if necessary for (1) access for inspections and maintenance, or (2) preservation of stormwater runoff conveyance, infiltration, and detention areas and other BMPs, by persons other than the property owner. The purpose of the easement shall be specified in any agreement under Section 405.

Section 607. Recording of Approved BMP Operations and Maintenance Plan and Related Agreements

A. The owner of any land upon which permanent BMPs will be placed, constructed or implemented, as described in the BMP Operations and Maintenance Plan, shall record the following documents in the Office of the Recorder of Deeds for Westmoreland County, within fifteen (15) days of approval of the BMP Operations Plan by the Municipality:

1. The Operations and Maintenance Plan, or a summary thereof,

2. Operations and Maintenance Agreements under Section 405, and

3. Easements under Section 406.

B. The Municipality may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this Section.

Section 608. Municipal Stormwater BMP Operation and Maintenance Fund

A. If stormwater BMPs are accepted by the municipality for dedication, the Municipality may require persons installing stormwater BMPs to pay a specified amount to the Municipal Stormwater BMP Operation and Maintenance Fund, to help defray costs of operations and maintenance activities. The amount may be determined as follows:

1. If the BMP is to be owned and maintained by the Municipality, the amount shall cover the estimated costs for operations and maintenance for ten (10) years, as determined by the Municipality.

2. The amount shall then be converted to present worth of the annual series values.

B. If a BMP is proposed that also serves as a recreation facility (e.g. ball field, lake), the Municipality may adjust the amount due accordingly.

C. The Municipality hereby establishes the fund referenced herein for purposes associated with the operation and maintenance of storm water BMPs taken over by the Municipality.

Section 609 – Plan Submission

A. All applications for permits required by this Ordinance shall be made on forms supplied by the Municipality. Such application shall provide a brief description of the stormwater management controls and the earth disturbance activity. This application shall become part of the Project Plan submission.

B. Three (3) copies of the completed Plan must be submitted to Municipality.

C. The Plan shall be accompanied by all required fee's as set forth in Article 6 of the this Ordinance.

ARTICLE VII – INSPECTIONS AND RIGHT OF ENTRY

Section 701. Inspections

A. Inspection programs may be established on any reasonable basis; random inspections; inspections based upon complaints, or other notice of possible violations; inspection of drainage basins or area identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutions or with discharges of a type which are more likely that the typical discharges of contaminants or pollutions or with discharges of a type which are more likely that the typical discharge to cause violations of state or federal water or sediment quality standards or the NPDES stormwater permit; and joint inspections with other agencies inspection under the environmental safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges from and water and materials in drainage control and BMP facilities; and evaluating the condition of drainage control and BMP facilities.

B. PADEP or it designees (e.g., County Conservation Districts) normally ensure compliance with any permits issued, including those for stormwater management. In addition to PADEP compliance programs, the Municipality or its designee may inspect all phases of the construction, operations, maintenance and any other implementation of stormwater BMP's.

C. During any stage of the Regulated Earth Disturbance activities, if the Municipality or its designee determines that nay BMP's are not being implemented in accordance with this Ordinance, the Municipality may suspend or revoke any existing permits or other approvals previously issued by the Municipality until the deficiencies are corrected.

Section 702. Right of Entry

A. Upon presentation of proper credentials, duly authorized representative of the Municipality may enter at reasonable times upon any property within the Municipality to inspect the implementation, condition, or operation and maintenance of the stormwater BMPs in regard to any aspect governed by this Ordinance.

B. BMP owners and operators shall allow persons working on behalf of the Municipality ready access to all parts of the premises for the purposes of determining compliance with this Ordinance.

C. Persons working on behalf of the Municipality shall have the right to temporarily locate on any BMP in the Municipality such devices as are necessary to conduct monitoring and/or sampling of the discharges from such BMP.

D. Unreasonable delays in allowing the Municipality access to a BMP is a violation of this Article.

ARTICLE VIII – FEES AND EXPENSES

Section 801. General

A. The Municipality may charge a reasonable fee for review of BMP Operations and Maintenance Plans to defray review costs incurred by the Municipality. The Applicant shall pay all such fees. Said fees to be established by a Resolution of the Municipality. No approval to commence any work on the project shall be issued until the requisite fees have been paid.

B. Modification of an existing plan shall require the payment of additional fees.

Section 802. Expenses Covered by Fees

The fees required by this Ordinance may cover:

A. Administrative Costs.

B. The review of the BMP Operations and Maintenance Plan by the Municipal Engineer.

C. The site inspections including, but not limited to, pre-construction meetings, inspections during construction of stormwater BMPs, and final inspection upon completion of the stormwater BMPs.

D. Any additional work required to monitor and enforce any provisions of this Ordinance, correct violations, and assure proper completion of stipulated remedial actions.

ARTICLE IX – PROHIBITIONS

Section 1001. Prohibited Discharges

A. No person in the Municipality shall allow, or cause to allow, stormwater discharges into the Municipality's separate storm sewer system which are not composed entirely of stormwater, except (1) as provided in subsection B below, and (2) discharges allowed under a state or federal permit.

B. Discharges which may be allowed, based on a finding by the Municipality that the discharge(s) do not significantly contribute to pollution to surface waters of the Commonwealth, are:

- Discharges from fire fighting activities
- Potable – water sources including dechlorinated water line and fire hydrant flushings
- Irrigation drainage
- Routine external building washdown (which does not use detergents or other compounds)
- Air conditioning condensate
- Water from individual residential car washing
- Springs
- Water from crawl space pumps
- Uncontaminated water from foundation or from footing drains
- Flows from riparian habitats and wetlands
- Lawn watering
- Pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used
- Dechlorinated swimming pool discharges
- Uncontaminated groundwater

C. In the event that the Municipality determines that any of the discharges identified in Subsection B significantly contribute to pollution of waters of the Commonwealth, or is so notified by DEP, the Municipality will notify the responsible person to cease the discharge.

D. Upon notice provided by the Municipality under subsection C, the discharger will have a reasonable time, as determined by the Municipality, to cease the discharge consistent with the degree of pollution caused by the discharge.

E. Nothing in this Section shall affect a discharger's responsibilities under state law.

Section 1002. Prohibited Connections

A. The following connections are prohibited, except as provided in Section 701.B above:

1. any drain or conveyance, whether on the surface or subsurface, which allows any non-storm water discharge including sewage, process wastewater, and wash water, to enter the separate storm sewer system, and any connections to the storm drain system from indoor drains and sinks; and

2. Any drain or conveyance connected from a commercial or industrial land use to the separate storm sewer system which has not been documented in plans, maps, or equivalent records, and approved by the Municipality.

Section 1003. Roof Drains

A. Roof drains shall not be connected to streets, sanitary or storm sewers or roadside ditches, except as provided in Section 703.B.

B. When it is more advantageous to connect directly to streets or storm sewers, connections of roof drains to street or roadside ditches may be permitted by the Municipality.

C. Roof drains shall discharge to infiltration areas or vegetative BMPs to the maximum extent practicable.

Section 1004. Alteration of BMPs

A. No person shall modify, remove, fill, landscape or alter any existing stormwater BMP, unless it is part of an approved maintenance program, without the written approval of the Municipality.

B. No person shall place any structure, fill, landscaping or vegetation into a stormwater BMP or within a drainage easement, which would limit or alter the functioning of the BMP, without the written approval of the Municipality.

ARTICLE XI – ENFORCEMENT AND PENALTIES

Section 1101. Public Nuisance

A. The violation of any provision of this ordinance is hereby deemed a Public Nuisance.

B. Each day that a violation continues shall constitute a separate violation.

Section 1102. Enforcement Generally

A. Whenever the Municipality finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, the Municipality may order compliance by written notice to the responsible person. Such notice may require without limitation:

1. The performance of monitoring, analyses, and reporting;

2. The elimination of prohibited connections or discharges;

3. Cessation of any violating discharges, practices, or operations;

4. The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property;

5. Payment of a fine to cover administrative and remediation costs;

6. The implementation of stormwater BMPs; and

7. Operation and maintenance of stormwater BMPs.

B. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violation(s). Said notice may further advise that, if applicable, should the violator fail to take the required action within the established deadline, the work will be done by the Municipality or designee and the expense thereof shall be charged to the violator.

C. Failure to comply within the time specified shall also subject such person to the penalty provisions of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent the Municipality from pursuing any and all other remedies available in law or equity.

Section 1103. Suspension and Revocation of Permits and Approvals

A. Any building, land development or other permit or approval issued by the Municipality may be suspended or revoked by the Municipality for:

1. Non – compliance with or failure to implement any provision of the permit;

2. A violation of any provision of this Ordinance; or

3. The creation of any condition or the commission of any act during construction or development which constitutes or creates a hazard or nuisance, pollution or which endangers the life or property of others.

B. A suspended permit or approval shall be reinstated by the Municipality when:

1. The Municipal Engineer or designee has inspected and approved the corrections to the stormwater BMPs, or the elimination of the hazard or nuisance, and/or;

2. The Municipality is satisfied that the violation of the Ordinance, law or rule and regulation has been corrected.

C. A permit or approval which has been revoked by the Municipality cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this Ordinance.

Section 1104. Penalties

A. Any person violating the provisions of this ordinance shall be guilty of a misdemeanor, and upon conviction shall be subject to a fine of not more the Five Hundred ($500.00) Dollars for each violation, recoverable with costs, or imprisonment of not more than Thirty (30) days, or both. Each day that the violation continues shall be a separate offense.

B. In addition, the Municipality, through its solicitor, may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief.

C. Any person found guilty of violating the provisions of the Ordinance shall also be required to pay the legal fee's and expenses that the Municipality has incurred as a result of each violation.

Section 1105 – Stop Work Order

Persons receiving a notice of violation will be required to halt all construction activities. This "stop work order" will be in effect until the Municipality confirms that the development activity is in compliance and violation has been satisfactorily addressed. Failu8re to address a notice of violation in a timely manner can result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized by this Ordinance.

Section 1106. Appeals

Any person aggrieved by any action of the Municipality or its designee, relevant the provisions of this ordinance, may appeal to the relevant judicial or administrative body according to law, within the time period allowed.

ENACTED and ORDAINED at a regular meeting of the _____ on the _____ day of _____, 2006. This Ordinance shall take effect immediately.

_____
[Name]

_____
[Title]

_____
[Name]

_____
[Title]

_____
[Name]

_____
[Title]

ATTEST:

_____
Secretary

I hereby certify that the foregoing Ordinance was advertised in the _____ on the _____day of _____, 200__, a newspaper of general circulation in the municipality and was duly enacted and approved as set forth at a regular meeting of the municipality's governing body held on the ___day of _____, 200__.

_____
Secretary

APPENDIX A

LOW IMPACT DEVELOPMENT PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

Natural hydrologic conditions may be altered radically by poorly planned development practices, such as introducing unneeded impervious surfaces, destroying existing drainage swales, constructing unnecessary storm sewers, and changing local topography. A traditional drainage approach of development has been to remove runoff from a site as quickly as possible and capture it in a detention basin. This approach leads ultimately to the degradation of water quality as well as expenditure of additional resources for detaining and managing concentrated runoff at some downstream location.

The recommended alternative approach is to promote practices that will minimize post development runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities. To simulate pre-development hydrologic conditions, forced infiltration is often necessary to offset the loss of infiltration by creation of impervious surfaces. The ability of the ground to infiltrate depends upon the soil types and its conditions.

Preserving natural hydrologic conditions requires careful alternative site design considerations. Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces, and protecting natural depression storage. A well-designed site will contain a mix of all those features. The following describes various techniques to achieve the alternative approach:

Preserving Natural Drainage Features. Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern – streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimizes the amount of grading on site.

Protecting Natural Depression Storage Areas. Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface runoff

volumes and trap pollutants. The volume and release – rate characteristics of depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.

Avoiding introduction of impervious areas. Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.

Reducing the Hydraulic Connectivity of Impervious Surfaces. Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing of roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff, and should help reduce concentration of runoff to a single point in the development.

Routing Roof Runoff Over Lawns. Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. By routing roof drains and crowning the driveway to run off to the lawn, the lawn is essentially used as a filter strip.

Reducing the Use of Storm Sewers. By reducing use of storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a "reasonable" time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.

Reducing Street Widths. Street widths can be reduced by either eliminating on-street parking or by reducing roadway widths. Municipal planners and traffic designers should encourage narrower neighborhood streets which ultimately could lower maintenance.

Limiting Sidewalks to One Side of the Street. A sidewalk on one side of the street may suffice in low – traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines. Where appropriate, backyard trails should be constructed using pervious materials.

Using Permeable Paving Materials. These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads.

Reducing Building Setbacks. Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low – traffic streets where traffic noise is not a problem.

Constructing Cluster Developments. Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

In summary, a careful consideration of the existing topography and implementation of a combination of the above mentioned techniques may avoid construction of costly stormwater control measures. Other benefits include reduced potential of downstream flooding, water quality degradation of receiving streams/water bodies and enhancement of aesthetics and reduction of development costs. Beneficial results include more stable base flows in receiving streams, improved groundwater recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.

APPENDIX B

STORMWATER BEST MANAGEMENT PRACTICES OPERATIONS AND MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 200__, by and between _____, (hereinafter the "Landowner"), and _____, Westmoreland County, Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of Westmoreland County, Pennsylvania, Deed Book Volume _____, page _____, (hereinafter "Property").

WHEREAS, the Landowner is proceeding to build and develop the Property; and

WHEREAS, the stormwater management BMP Operations and Maintenance Plan approved by the Municipality (hereinafter referred to as the "Plan") for the property identified herein, which is attached hereto as Appendix A and made a part hereof, as approved by the Municipality, provides for management of stormwater within the confines of the Property through the use of Best Management Practices (BMP's); and

WHEREAS, for the purposes of this agreement, the following definitions shall apply:

BMP – "Best Management Practice;" activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect

and maintain water quality and groundwater recharge and to otherwise meet the purposes of the Municipal Stormwater Management Ordinance, including but not limited to infiltration trenches, seepage pits, filter strips, bioretention, wet ponds, permeable paving, rain gardens, grassed swales, forested buffers, sand filters and detention basins.

Infiltration Trench – A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

Seepage Pit – An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

Rain Garden – A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer, and

WHEREAS, the Municipality requires, through the implementation of the Plan, that stormwater management BMP's as required by said Plan and the Municipal Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, his successors and assigns, and

NOW, THEREFORE, in consideration of the foregoing promises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.

2. The Landowner shall operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific maintenance requirements noted on the Plan.

3. The Landowner hereby grants permission to the Municipality, its authorized agents and employees, to enter upon the property, at reasonable times and upon presentation of proper identification, to inspect the BMP(s) whenever it deems necessary. Whenever possible, the Municipality shall notify the Landowner prior to entering the property.

4. In the event the Landowner fails to operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality, the Municipality or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). This provision shall not be construed to allow the Municipality to erect any permanent structure on the land of the Landowner. It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.

5. In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall

reimburse the Municipality for all expenses (direct and indirect) incurred within ten (10) days of receipt of invoice from the Municipality.

6. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMP(s) by the Landowner; provided, however, that this Agreement shall not be deemed to create or effect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.

7. The Landowner, its executors, administrators, assigns, and other successors in interests, shall release the Municipality's employees and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMP(s) by the Landowner or Municipality. In the event that a claim is asserted against the Municipality, its designated representatives or employees, the Municipality shall promptly notify the Landowner and the Landowner shall defend, at his own expense, any suit based on the claim. If any judgment or claims against the Municipality's employees or designated representatives shall be allowed, the Landowner shall pay all costs and expenses regarding said judgment or claim.

8. The Municipality shall inspect the BMP(s) at a minimum of once every three (3) years to ensure their continued functioning.

This Agreement shall be recorded at the Office of the Recorder of Deeds of Westmoreland County, Pennsylvania, and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Landowner, his administrators, executors, assigns, heirs and any other successors in interests, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

TOWNSHIP OF MOUNT PLEASANT

By _____
Supervisor

By _____
Supervisor

By _____
Supervisor

(SEAL)

For the Landowner:

_____

ATTEST:

_____
Secretary

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF WESTMORELAND)

On this the _____ day of _____, 2007, before me, a notary public, the undersigned officer, personally appeared _____, known to me or satisfactorily proven to be the person whose name is subscribed to the within instrument and acknowledged that he/she executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

_____
Notary Public

My Commission Expires:_____

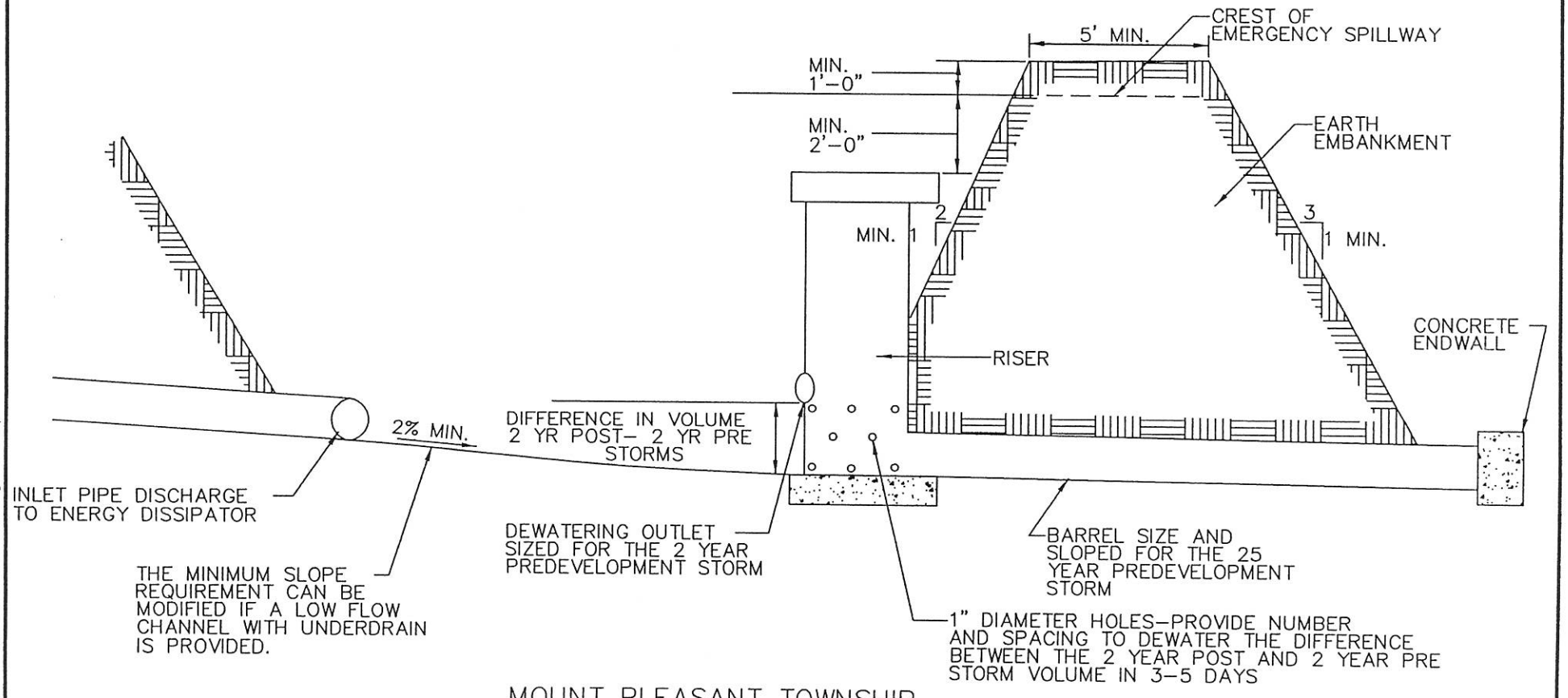
Table 1
Inlet Capacity Reduction Factors
Assuming Partial Clogging

Condition	Inlet Type	Reduction Factor*
Sump	Side opening	0.80
Sump	Grate	0.50
Sump	Combination	0.65
Continuous grade	Side opening	0.80
Continuous grade	Side opening with deflector	0.75
Continuous grade	Longitudinal bars	0.60
Continuous grade	Transverse bars	0.50
Continuous grade	Combination	0.60

NOTES:
*Percentage of theoretical capacity.

Table 2
Spacing of Inspection and Cleanout
Structures for Storm Sewers

Size of Pipe (inches)	Maximum Allowable Spacing (feet)
15	400
18 to 36	500
42 to 60	700
66 or larger	Unlimited



MOUNT PLEASANT TOWNSHIP
DESIGN ELEVATIONS WITH EMERGENCY SPILLWAY

N.T.S.

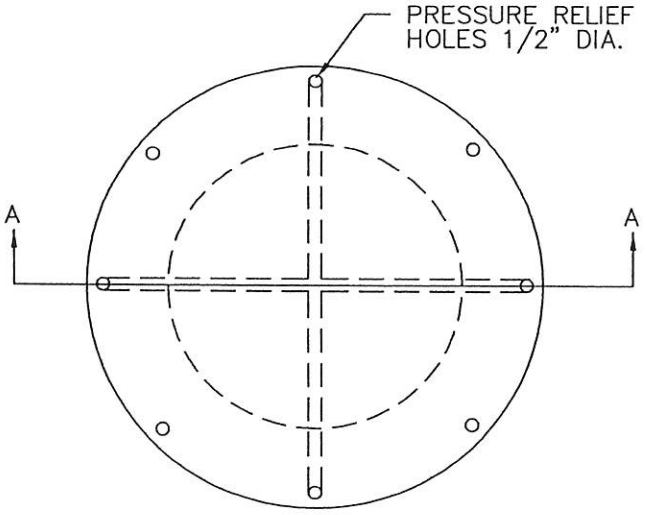
PLATE 'A'

NOTE:
TOP WIDTH AND SIDE SLOPES OF EARTH EMBANKMENT SHOWN ARE MINIMUM REQUIREMENTS. ACTUAL DIMENSIONS SHALL BE DETERMINED BY DEVELOPERS CONSULTANT.

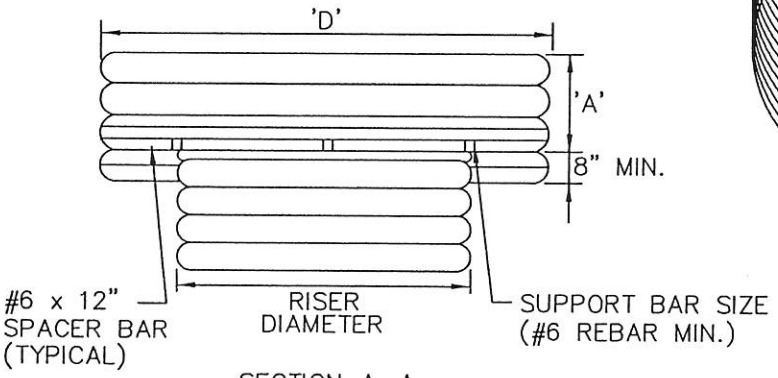
VICTOR P. REGOLA & ASSOCIATES, INC.

MARCH, 2006

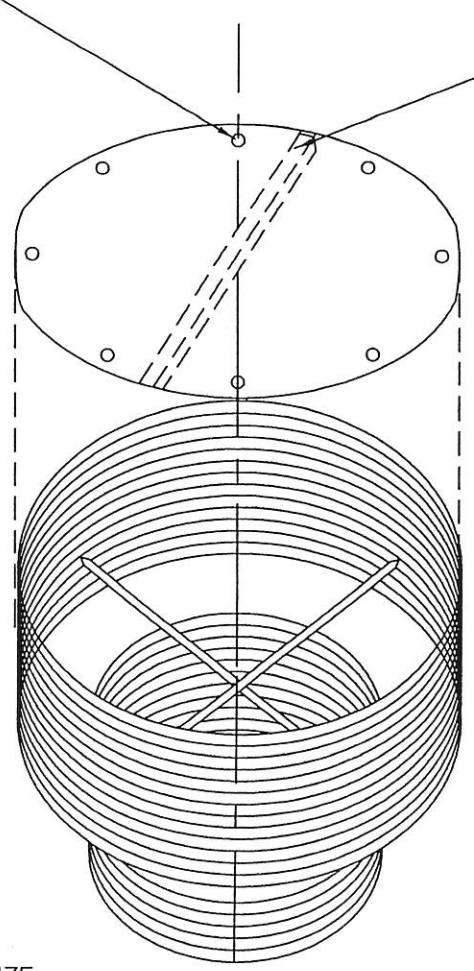
C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-A.DWG



PLAN
'D'



SECTION A–A



ISOMETRIC

TOP STIFFENER (IF REQUIRED) IS _____x_____x_____ ANGLE WELDED TO TOP AND ORIENTED PERPENDICULAR TO CORRUGATIONS.

TOP IS _____GAGE CORRUGATED METAL OR 1/8" STEEL PLATE. PRESSURE RELIEF HOLES MAY BE OMITTED, IF ENDS OF CORRUGATIONS ARE LEFT FULLY OPEN WHEN THE TOP IS ATTACHED.

CYLINDER IS _____ GAGE CORRUGATED METAL PIPE OR FABRICATED FROM 1/8" STEEL PLATE.

NOTE:

1. THE CYLINDER MUST BE FIRMLY FASTENED TO THE TOP OF THE RISER.

2. SUPPORT BARS ARE WELDED TO THE TOP OF THE RISER OR ATTACHED BY STRAPS BOLTED TO TOP OF RISER.

MOUNT PLEASANT TOWNSHIP

ANTI – VORTEX DEVICE DESIGN

N.T.S.

PLATE 'B'

VICTOR P. REGOLA & ASSOCIATES, INC.

C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-B.DWG

CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE DESIGN TABLE

PLATE C

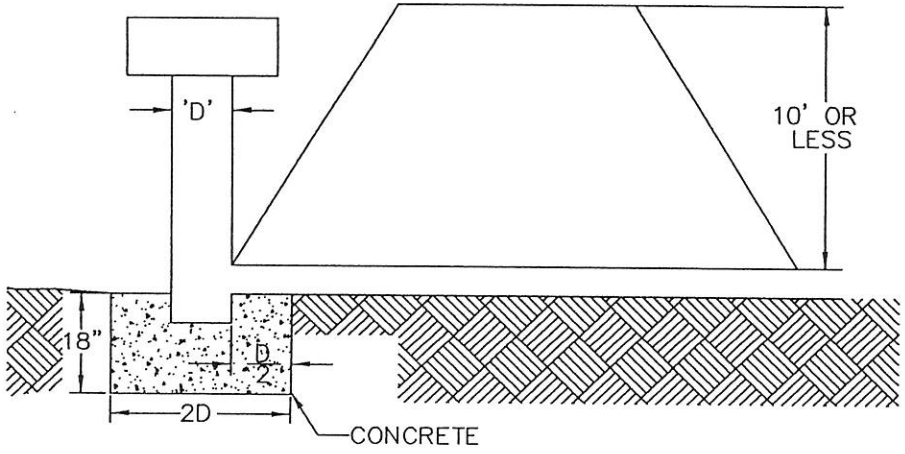
RISER DIAMETER, in.	CYLINDER DIAMETER, in.	CYLINDER THICK., gage	H, in.	MINIMUM SIZE SUPPORT BAR	MINIMUM TOP THICKNESS	MINIMUM TOP STIFFENER
12	18	16	6	#6 Rebar	16 gage	–
15	21	16	7	"	"	–
18	27	16	8	"	"	–
21	30	16	11	"	"	–
24	36	16	13	"	14 gage	–
27	42	16	15	"	"	–
36	54	14	17	#8 Rebar	12 gage	–
42	60	14	19	"	"	–
48	72	12	21	1-1/4" Pipe or 1-1/4x1-1/4x1/4 angle	10 gage	–
54	78	12	25	"	"	–
60	90	12	29	1-1/2" Pipe or 1-1/2x1-1/2x1/4 angle	8 gage	–
66	96	10	33	2" Pipe or 2x2x3/16 angle	8 gage w/ stiffener	2 x 2 x 1/4 angle
72	102	10	36	"	"	2-1/2 x 2-1/2 x 1/4 angle
78	114	10	39	2-1/2" Pipe or 2x2x1/4 angle	"	"
84	120	10	42	2-1/2" Pipe or 2-1/2x2-1/2x1/4 angle	"	2-1/2 x 2-1/2 x 5/16 angle

SOURCE: USDA-SCS

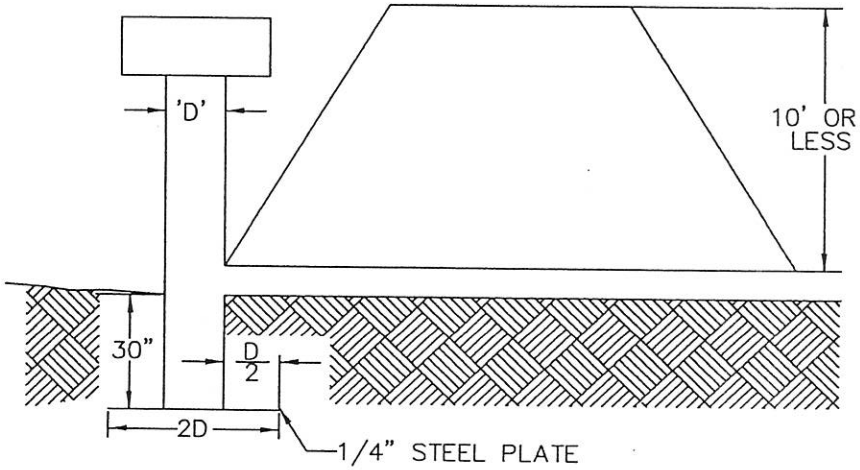
VICTOR P. REGOLA & ASSOCIATES, INC.

C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-C.DWG

CONCRETE BASE FOR EMBANKEMENT
10' OR LESS IN HEIGHT



STEEL BASE FOR EMBANKMENT
10' OR LESS IN HEIGHT



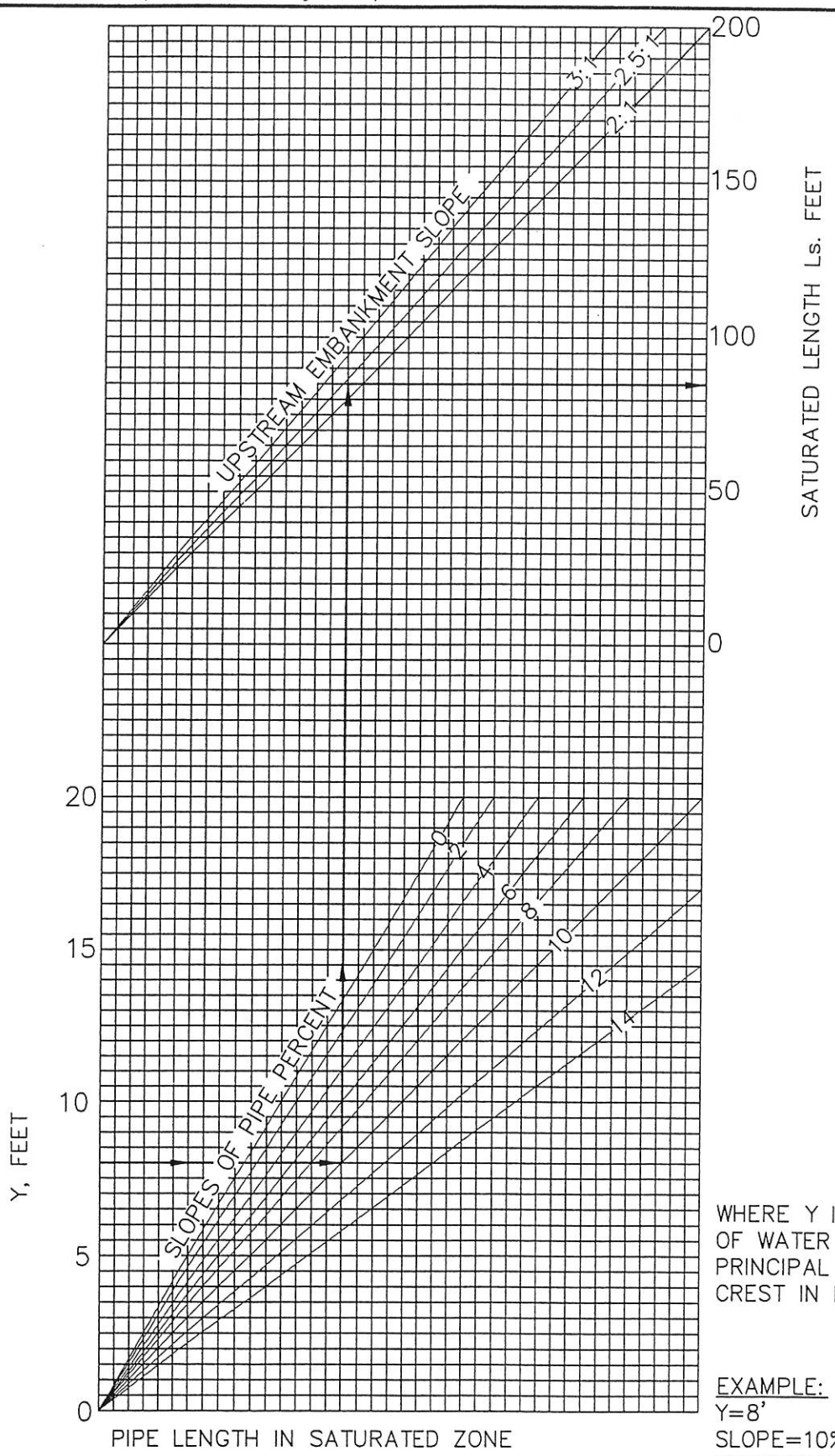
MOUNT PLEASANT TOWNSHIP
RISER PIPE BASE CONDITIONS FOR EMBANKMENTS
LESS THEN 10' HIGH
PLATE 'D'

C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-D.DWG

VICTOR P. REGOLA & ASSOCIATES, INC.

MARCH, 2006

C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-E.DWG



WHERE Y IS THE DEPTH OF WATER AT THE PRINCIPAL SPILLWAY CREST IN FEET

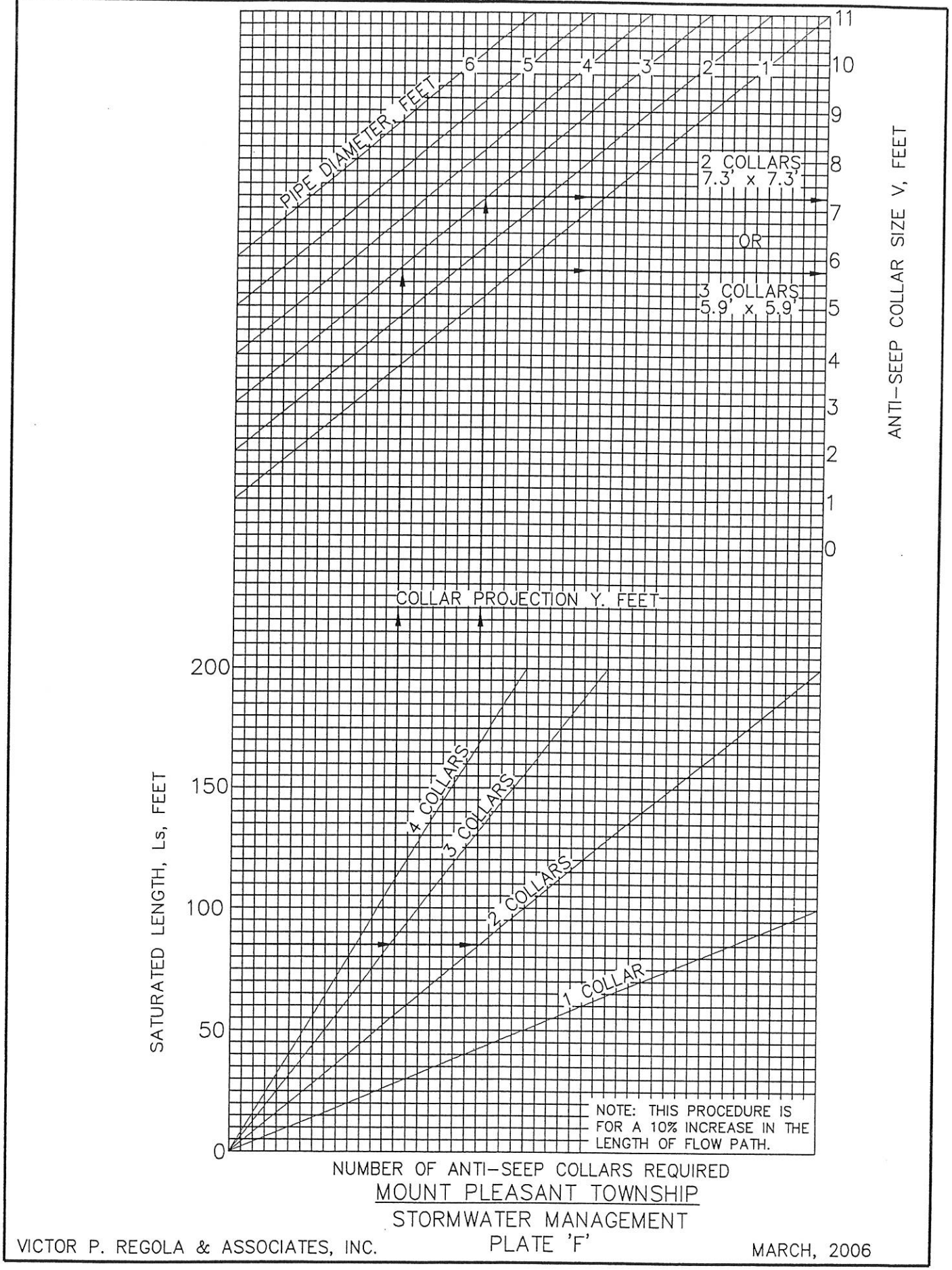
EXAMPLE:
Y=8'
SLOPE=10%
EMBANKMENT SLOPE 2.5:1
FIND SATURATED LENGTH
= 85 FEET

MOUNT PLEASANT TOWNSHIP
STORMWATER MANAGEMENT
PLATE 'E'

VICTOR P. REGOLA & ASSOCIATES, INC.

MARCH, 2006

C:\CADD FILES\MT. PLEASANT\Stormwater Managemnet\PLATE-F.DWG



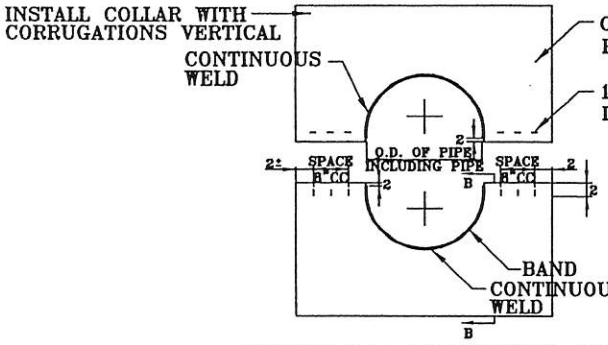
MOUNT PLEASANT TOWNSHIP

STORMWATER MANAGEMENT

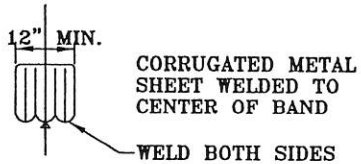
PLATE 'F'

VICTOR P. REGOLA & ASSOCIATES, INC.

MARCH, 2006



ELEVATION OF UNASSEMBLED COLLAR



SECTION B-B

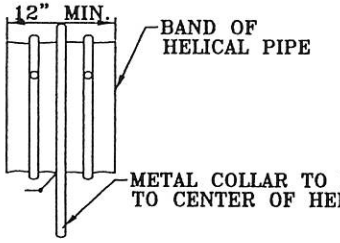
NOTES FOR COLLARS:

1. ALL MATERIALS TO BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
2. WHEN SPECIFIED ON THE PLANS, COATING OF COLLARS SHALL BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
3. UNASSEMBLED COLLARS SHALL BE MARKED BY PAINTING OR TAGGING TO IDENTIFY MATCHING PAIRS.
4. THE LAP BETWEEN THE TWO HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING BAND SHALL BE CAULKED WITH ASPHALT MASTIC AT TIME OF INSTALLATION.
5. EACH COLLAR SHALL BE FURNISHED WITH TWO 1/2" DIAMETER RODS WITH STANDARD TANK LUGS FOR CONNECTING COLLARS TO PIPE.

DETAILS OF CORRUGATED METAL ANTI-SEEP COLLAR

SIZE AND SPACING OF SLOTTED OPENINGS SHALL BE THE SAME AS SHOWN FOR CM COLLAR SHOWN

USE RODS AND LUGS TO CLAMP BANDS SECURELY TO PIPE



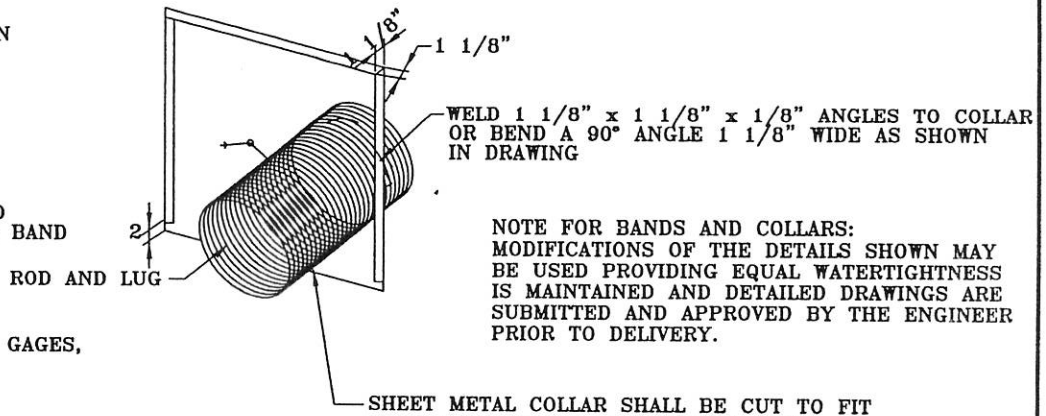
PARTIAL ELEVATION

REF: ENGR. FIELD MANUAL (USDA-SCS)

NOTE: FOR DETAILS OF FABRICATION DIMENSIONS, MINIMUM GAGES, SLOTTED HOLES, AND NOTES, SEE DETAIL ABOVE.

DETAILS OF HELICAL PIPE ANTI-SEEP COLLAR

NOTE: TWO OTHER TYPES OF ANTI-SEEP COLLARS ARE:
1. CORRUGATED METAL, SIMILAR TO UPPER DETAIL, EXCEPT SHOP WELDED TO A SHORT (4 FT.) SECTION OF THE PIPE AND CONNECTED WITH CONNECTING BANDS TO THE PIPE.
2. CONCRETE, SIX INCHES THICK FORMED AROUND THE PIPE WITH #3 REBAR SPACED 15" HORIZONTALLY AND VERTICALLY.



NOTE FOR BANDS AND COLLARS: MODIFICATIONS OF THE DETAILS SHOWN MAY BE USED PROVIDING EQUAL WATERTIGHTNESS IS MAINTAINED AND DETAILED DRAWINGS ARE SUBMITTED AND APPROVED BY THE ENGINEER PRIOR TO DELIVERY.

ISOMETRIC VIEW

MOUNT PLEASANT TOWNSHIP

PLATE 'G'

VICTOR P. REGOLA & ASSOCIATES, INC.

MARCH, 2006

C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-G.DWG

NOTES FOR COLLARS

1. ALL MATERIALS TO BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
2. WHEN SPECIFIED ON THE PLANS, COATING OF COLLARS SHALL BE IN ACCORDANCE WITH CONSTRUCTION AND CONSTRUCTION MATERIAL SPECIFICATIONS.
3. UNASSEMBLED COLLARS SHALL BE MARKED BY PAINTING OR TAGGING TO IDENTIFY ********* PAIRS.
4. THE LAP BETWEEN THE TWO HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING ***** SHALL BE CAULKED WITH ASPHALT MASTIC AT ***** OF INSTALLATION.
5. EACH COLLAR SHALL BE FURNISHED WITH TWO 1/2" DIAMETER RODS WITH STANDARD TANK LUGS FOR CONNECTING COLLARS TO PIPE.

DETAILS OF MELICAL PIPE ANTI-SEEP COLLAR

NOTE: TWO OTHER TYPES OF ANTI-SEEP COLLARS ARE:

1. CORRUGATED METAL, ***** TO UPPER CERAIL, EXCEPT SHOP WELDED TO A SHORT (2 FT.) SECTION OF THE PIPE AND CONNECTED WITH CONNECTING BANDS TO THE PIPE.
2. CONCRETE, SIX INCHES THICK FORMED AROUND THE PIPE WITH 13 REBAR COATED 15" HORIZONTALLY AND VERTICALLY.

NOTE FOR BANDS AND COLLARS: MODIFICATIONS OF THE DETAILS SHOWN MAY BE USED PROVIDING EQUAL WATERTIGHTNESS IS SAINTAINED AND DETAILED DRAWINGS ARE

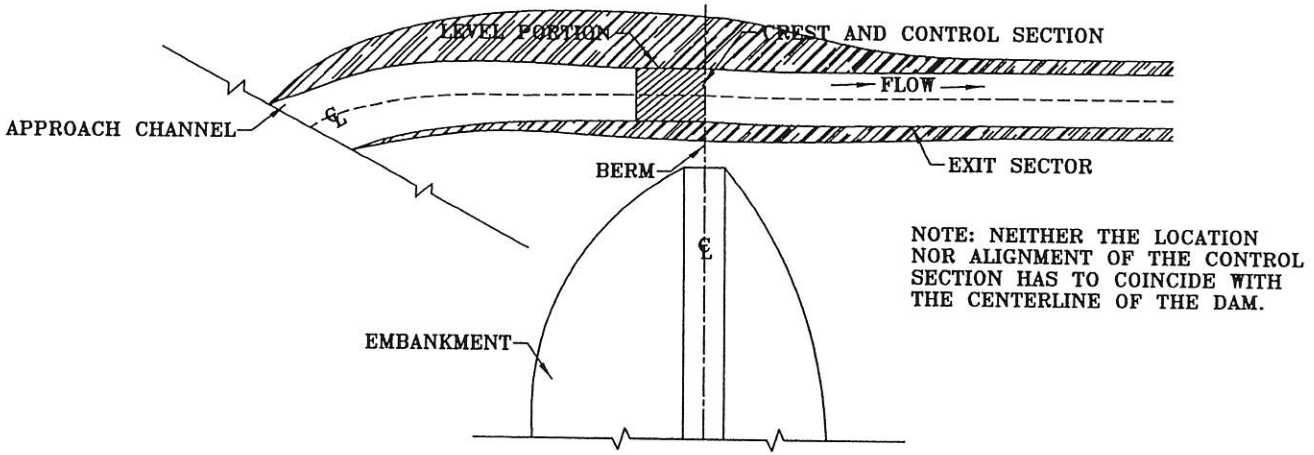
MOUNT PLEASANT TOWNSHIP

DETAILS OF CORRUGATED METAL ANTI-SEEP COLLAR

PLATE 'G'

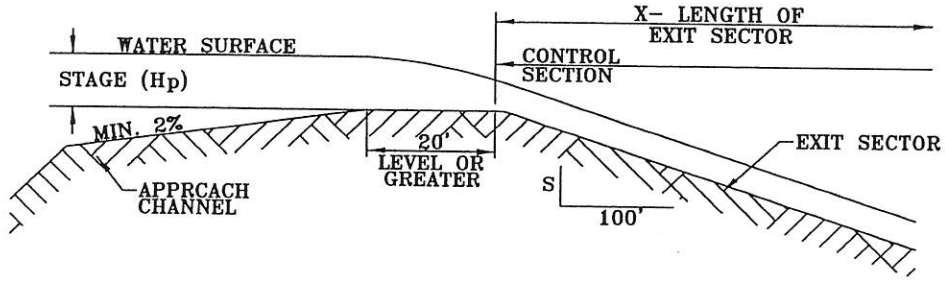
VICTOR P. REGOLA & ASSOCIATES, INC. MARCH, 2006

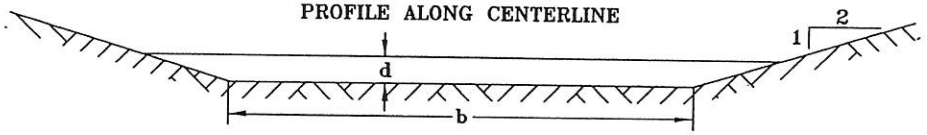
C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-G.DWG



NOTE: NEITHER THE LOCATION NOR ALIGNMENT OF THE CONTROL SECTION HAS TO COINCIDE WITH THE CENTERLINE OF THE DAM.

PLAN





CROSS-SECTION AT CONTROL SECTION

MOUNT PLEASANT TOWNSHIP
STORMWATER MANAGEMENT
PLATE 'H'

VICTOR P. REGOLA & ASSOCIATES, INC.

MARCH, 2006

C:\CADD FILES\MT. PLEASANT\Stormwater Management\PLATE-H.DWG

DESIGN DATA FOR EARTH SPILLWAYS

STAGE (Hp) IN FEET	SPILLWAY VARIABLES	BOTTOM WIDTH (b) IN FEET																
		8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
0.5	Q	6	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28
	V	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2 7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	S	3.9	3.9	3.9	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
	X	32	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.6	Q	8	10	12	14	16	18	20	22	24	26	28	30	32	34	35	37	39
	V	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	S	3.7	3.7	3.7	3.7	3.6	3.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	X	36	36	36	36	36	36	37	37	37	37	37	37	37	37	37	37	37
0.7	Q	11	13	16	18	20	23	25	28	30	33	35	38	41	43	44	46	48
	V	3.2	3.2	3.3	3.3	3.3	3.3	3.3	3.3	3 3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
	S	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	X	39	40	40	40	41	41	41	41	41	41	41	41	41	41	41	41	41
0.8	Q	13	16	19	22	26	29	32	35	38	42	45	48	48	51	54	57	60
	V	3.5	3.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
	S	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	X	44	44	44	44	45	45	45	45	45	45	45	45	45	45	45	45	45
0.9	Q	17	20	24	29	32	35	39	43	47	51	53	57	60	64	68	71	75
	V	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3 8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
	S	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
	X	47	47	48	48	48	48	48	48	48	48	49	49	49	49	49	49	49
1.0	Q	20	24	29	33	38	42	47	51	56	61	63	68	72	77	81	86	90
	V	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	S	3.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	X	51	51	51	51	52	52	52	52	52	52	52	52	52	52	52	52	52
1.1	Q	23	28	34	39	44	49	54	60	55	70	74	79	84	89	95	100	105
	V	4.2	4.2	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	S	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	X	55	55	55	55	55	55	55	56	56	56	56	56	56	56	56	56	56
1.2	Q	28	33	40	45	51	58	64	69	76	80	86	92	98	104	110	116	122
	V	4.4	4.4	4.4	4.4	4.4	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	S	2.9	2.9	2.8	2.8	2.8	2 8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.8	2.8
	X	58	58	59	59	59	59	59	59	60	60	60	60	60	60	60	60	60
1.3	Q	32	38	46	53	58	65	73	80	86	91	99	106	112	119	125	133	140
	V	4.5	4.6	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
	S	2.8	2.9	2.9	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	X	62	62	62	6 3	63	63	63	63	53	63	63	53	64	64	64	54	64	64
1.4	Q	37	44	51	59	66	7 4	82	90	96	103	111	119	127	34	142	150	158
	V	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	4.9	4 9	49	49	4 9
	S	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.5	2.6	2.5	2.6	2.6	2.6	2.5	2.6
	X	65	66	66	66	66	67	67	67	67	57	67	68	68	68	68	68	69
1.5	Q	4.1	50	58	66	75	85	92	101	108	116	125	133	142	150	160	169	178
	V	4.8	4.9	4.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.1	5.1
	S	2.7	2 7	2.5	2.5	2.6	2.6	2.5	2.6	2.5	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5
	X	69	69	70	70	71	7 1	71	71	71	71	71	72	72	72	72	72	72
1.6	Q	46	58	65	75	84	9 4	104	112	122	132	142	149	158	168	178	187	197
	V	5.0	5.1	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
	S	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	X	72	74	74	75	75	76	76	76	76	76	76	76	76	76	76	76	76
1.7	Q	52	62	72	83	94	105	115	126	135	145	156	167	175	187	196	206	217
	V	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
	S	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	X	76	78	79	80	80	80	80	80	80	80	80	80	80	80	80	80	80
1.8	Q	58	69	81	93	104	116	127	138	150	160	171	182	194	204	214	226	233
	V	5.3	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.6	5.6	56	5.6	5.6	5.6
	S	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	X	80	82	83	84	84	84	84	34	84	84	84	84	84	84	84	84	84
1.9	Q	64	76	88	102	114	127	140	152	164	175	188	201	213	225	235	248	250
	V	5.5	5.5	5.5	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
	S	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	X	84	85	36	87	88	88	88	88	88	88	88	88	88	88	88	88	88
2.0	Q	71	83	97	111	125	138	153	164	178	193	204	218	232	245	256	269	283
	V	5.6	5.7	5.7	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9	5.9	5.9
	S	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	X	88	90	91	91	91	91	92	92	92	92	92	92	92	92	92	92	92
2.1	Q	77	91	107	122	135	149	162	177	192	207	220	234	250	267	276	291	305
	V	5.7	5.8	5.9	5.9	5.9	5.9	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	S	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	X	92	93	95	95	95	95	95	95	95	96	96	96	96	96	96	96	96
2.2	Q	84	100	116	131	146	163	177	194	210	224	238	253	269	288	301	314	330
	V	5.9	5.9	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.2
	S	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	X	96	98	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100
2.3	Q	90	108	124	140	158	175	193	208	226	243	258	275	292	306	323	341	354
	V	6.0	6.1	61	6.1	6.2	6.2	6.2	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
	S	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	X	100	102	102	103	103	103	104	104	104	105	105	105	105	105	105	105	105
2.4	Q	99	116	136	152	170	189	206	224	241	260	275	294	312	327	346	364	378
	V	6.1	6.2	6.2	6.3	6.3	6.3	6.4	6.4	64	6.4	64	64	6.4	6.4	6.4	64	6.4
	S	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	X	105	105	106	107	107	108	108	108	108	109	109	109	109	109	109	109	109

SOURCE: USDA-SCS

PLATE I