

**ORDINANCE NO. 117**

**AN ORDINANCE ESTABLISHING REGULATIONS FOR THE  
MANAGEMENT OF STORMWATER AND STORMWATER  
FACILITIES IN THE TOWNSHIP OF DAUGHERTY, BEAVER  
COUNTY, PENNSYLVANIA.**

The Board of Supervisors of the Township of Daugherty in the County of Beaver and the Commonwealth of Pennsylvania hereby ordains:

**Article I. GENERAL PROVISIONS**

**Section 101 Short Title**

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

**Section 102 Statement of Findings**

The Board of Supervisors of Daugherty Township 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 loadings 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 Daugherty Township 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 Township.**

### **Section 103 Purpose**

The purpose of this Ordinance is to promote health, safety, and welfare within Daugherty Township 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 Township.**

- 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 Township's separate storm sewer system.

**Section 104 Statutory Authority**

The Board of Supervisors of Daugherty Township is empowered to regulate land use activities that affect stormwater impacts by the authority of Article XXVII, Section 2701 et seq. of the Second Class Township Code.

**Section 105 Applicability**

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

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 Township inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

**Section 107 Severability**

Should any section, clause, provision or portion of this Ordinance be declared by a court of competent jurisdiction to be invalid or unconstitutional, such decision shall not affect or impair the validity of any other section, clause, provision or portion of this Ordinance.

It is hereby declared to be the intent of the Board of Supervisors of Daugherty Township, that this Ordinance would have been adopted by the Township had such invalid or unconstitutional provision not been included herein, and the remaining portion declared invalid or unconstitutional had never been a part hereof.

**Section 108 Compatibility with Other Requirements**

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.

Nothing in this Ordinance shall be construed to affect any of the Township's requirements regarding stormwater matters which do not conflict with the provisions of this Ordinance. Conflicting provisions in other Township ordinances or regulations shall be construed to retain the requirements of this Ordinance addressing State Water Quality Requirements.

### **Section 109 Enactment of Amendments**

This Ordinance may be amended by action of the Board of Supervisors in accordance with the 2<sup>nd</sup> Class Township Code; however, the construction specifications standards noted in Article IV of this Ordinance as they pertain to any particular public or private Stormwater Management improvement may be amended by Resolution of the Board of Supervisors upon recommendation of the Township Engineer and Township Manager.

### **Section 110 Effective Date**

This Ordinance shall become effective after the fifth day after the final enactment or adoption and shall remain in full force and effect until amended or revoked.

## **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.

**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.

**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 Township.

**ARCHITECT** - A registered architect licensed as such in the Commonwealth of Pennsylvania.

**AS-BUILT PLAN** - A drawing showing the final as-built location, elevation and/or depth, size and materials of all completed public and private improvements including the location of all easements.

**BEDROCK** - Natural rock layer, hard or soft, in place at ground surface or beneath unconsolidated superficial deposits.

**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. BMPs 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.

**BOARD OF SUPERVISORS** - The Board of Supervisors of Daugherty Township.

**BUILDING CODE** - Ordinance 114, Uniform Construction Code

**CONSERVATION DISTRICT** – The Beaver County Conservation District.

**CONSTRUCTION STANDARDS** - The construction standards for BMPs as set forth in this Ordinance.

**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 Township.

**DEVELOPMENT** - See "Earth Disturbance Activity." The term includes redevelopment.

**DEVELOPMENT SITE** - The specific tract of land where any Earth Disturbance activities in the Township) 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.

**ENGINEER** - A registered professional engineer licensed as such in the Commonwealth of Pennsylvania and knowledgeable in civil engineering; the Engineer who is charged with the design, development and inspection of the work, and determining the quantities of materials and labor to be paid for. During the execution of the work the Engineer shall also be interpreted to mean the assistant, inspector, or other representative acting within the authority given. The Engineer is to be considered an agent of Daugherty Township.

**EROSION** - The detachment and movement of soil or rock fragments by water, wind, ice or gravity, including such processes as gravitational creep.

**EROSION AND SEDIMENT CONTROL PLAN** - A plan for a project site which identifies BMPs to minimize accelerated erosion and sedimentation.

**EXCAVATION** - Any act by which earth, sand, gravel, rock or any other similar material is cut into, disturbed, quarried, uncovered, removed, displaced, relocated or bulldozed and shall include the conditions resulting therefrom.

**FILL** - Any act by which earth, sand, gravel, rock or any other material is deposited, placed, pushed, dumped, pulled, transported or moved to a new location including the condition resulting therefrom.

**FINANCIAL SECURITY** - A corporate bond letter of credit, or escrow account from a surety or a financial institution acceptable to the Township, naming the Township as obligee in forms specified in this Ordinance.

**FLOOD** - A temporary inundation of normally dry land areas.

**GEOLOGIST** - A registered professional geologist licensed as such by the Commonwealth of Pennsylvania.

**GEOTECHNICAL ENGINEERING REPORT** - A report prepared by a registered professional geological engineer.

**GRADE** - The elevation of the existing or proposed ground surface at the location of any proposed excavation or fill.

**GRADING** - Any excavation or fill or a combination thereof.

**GRADING ADMINISTRATOR** - The Township Manager or his designated representative.

**GRADING PERMIT** - A permit required pursuant to the provisions of Article II, Section 2.1 of Ordinance 87, GRADING.

**GROUNDWATER RECHARGE** - Replenishment of existing natural underground water supplies.

**HAZARD** - Any danger or potential danger to life, limb or health, or any adverse effect or potential adverse effect to the safety, use or stability of property, waterways, public ways, structures, utilities and storm sewers, including stream pollution.

**IDENTIFIED FLOODPLAIN AREA** - The floodplain area specifically identified in Township Ordinance 69, Floodplain Management, as being inundated by the one-hundred-year flood. Included would be areas identified as floodway (FW), flood-fringe (FF) and general floodplain (FA).

**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.

**LANDOWNER** - The legal or beneficial owner or owners of a lot or parcel of land, including the holder of an option or contract to purchase (whether or not such option or contract is subject to any conditions), a lessee (if he authorized under the lease to exercise the rights of the landowner) or other persons having a proprietary interest in the lot.

**LANDSCAPE ARCHITECT** - A landscape architect licensed by the Commonwealth of Pennsylvania.

**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.

**OFF-SITE BORROW AREA** - Excavating, loading, hauling and placement of excavated material on another site for disposal.

**OFF-SITE SPOIL AREAS** - Storage of excavated material and stockpiling on waste areas and dump sites including topsoil, aggregates and other miscellaneous materials.

**ONE-HUNDRED- YEAR FLOOD** - A flood that, on the average, is likely to occur once every 100 years (i.e., that has a one-percent chance of occurring each year, although the flood may occur in any year).

**OUTFALL** - "Point source" as described in 40 CFR § 122.2 at the point where the Township's storm sewer system discharges to surface waters of the Commonwealth.

**PARKING AREA** - A public or private garage or a paved, open off-street area other than a driveway or street with adequate means of access, which meets the requirements of this Ordinance and which is used exclusively for the parking of vehicles of occupants or visitors of the lot; however, a driveway serving a single-family dwelling or which is for the exclusive use of an individual dwelling unit in a residential building may be used as a parking area.

**PERMIT HOLDER** - Any landowner, agent of said landowner, or tenant with the permission of said landowner who has been granted a grading permit pursuant to the provisions of this part.

**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 Township are planned, conducted, or maintained.

**REDEVELOPMENT** - Earth Disturbance activities on land which has previously been disturbed or developed.

**REGULATED EARTH DISTURBANCE ACTIVITY** - Earth disturbance activity one acre or more with a point source discharge to surface waters or the Township's storm sewer system, or five acres or more regardless of the planned runoff. This includes earth disturbance on any portion of, part, or during any stage of, a larger common plan of development. This only includes road maintenance activities involving 25 acres or more of earth 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.

**SECURITY** - A bond, letter of credit or cash provided by the permit holder to secure performance under this Ordinance.

**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.

**SITE** - A lot, tract or parcel of land, or a series of lots, tracts or parcels of land which are adjoining and with respect to which grading work is to be continuous and performed at the same time.

**SLOPE** - The upward or downward slant or inclination or degree of slant, expressed either as a horizontal-to-vertical ratio or as a percentage of vertical inclination from the horizontal.

**SOIL CONSERVATION REPORT** - A report, prepared by a registered professional engineer, that includes a description of a site and topography, drainage, cover, soils, soil limitations, erosion and sediment potential, surface runoff changes and recommendations to minimize soil limitations, erosion and sediment, and surface water disposal problems.

**SOILS ENGINEER** - A registered professional engineer licensed as such in the Commonwealth of Pennsylvania and having training and experience in the branch of soils engineering.

**SOILS SURVEY** - The survey for Beaver County, Pennsylvania, and the accompanying text, soil survey of Beaver County, Pennsylvania, as prepared by the USDA Soil Conservation Service, et al.

**SPECIFICATIONS** - Those portions of the contract documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the work.

**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 area 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** - The surface runoff generated by precipitation reaching the ground surface.

**STREET** - An avenue, boulevard, road, highway, freeway, parkway, lane, viaduct and any other ways used by vehicular traffic but not including driveways, parking areas or walkways. Street includes the entire right-of-way.

**SUPERVISORS** - The Board of Supervisors Daugherty Township.

**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.

**TOWNSHIP** - Daugherty Township, a second class Township located in Beaver County, Pennsylvania.

**TOWNSHIP ENGINEER** - The appointed engineer of the Daugherty Township.

**TOWNSHIP MANAGER** - The Manager of Daugherty Township.

**TRENCH** - An excavation made for installation or replacement of utilities where the depth exceeds the width of the trench.

**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 REQUIREMENTS**

### **Section 301 Permit Requirements 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 302 Permit requirements by the Township**

- A.** Adequate stormwater drainage facilities shall be installed in conformance with a stormwater management plan to ensure that stormwater does not flow onto abutting property, sidewalks or streets in such quantities as to cause a detrimental effect. The stormwater management plan shall ensure to the satisfaction of the Township that rates of runoff after development shall not be greater than the runoff that would occur on the site in its natural state.
- B.** The stormwater management plan shall comply with the Pennsylvania Stormwater Management Act, P.L. 869, No. 167, and be prepared in accordance with standards and specifications established by the Township.
- C.** All materials and methods of construction and installation shall meet and comply with the requirements of Commonwealth of Pennsylvania Department of Transportation's Form 408, current edition, and their Standards for Roadway Construction Series RC-0 to 100, current edition.
- D.** Precast concrete inlets with metal castings and metal grates of the type specified on the standards and specifications established by this Ordinance shall be installed as directed by the Township Engineer.

- E. Precast manholes with metal frames and metal covers of the type specified on the standards and specifications established by this Ordinance shall be installed at all changes in alignment and grades of stormwater sewers as may be directed by the Township Engineer to provide for proper maintenance. Inlets may be substituted for manholes where practical.
- F. Stormwater sewers shall be located in the street right-of-way or in a drainage easement.
- G. Stormwater sewer pipe or culverts installed shall be of the class of material and size as specified in this Ordinance, and approved by the Township Engineer.
- H. In the design of stormwater sewer installations, special consideration shall be given to avoidance of problems that may arise from concentration of stormwater runoff over adjacent properties, including release or discharge of stormwater onto and across adjacent land when required.
- I. Bridges and culverts shall be designed to support the expected loads, to carry expected flows and be constructed the full width of the right-of-way where deemed necessary by the Township Engineer.
- J. Stormwater management plans shall be prepared and submitted in accordance with the specifications in this Ordinance, and approved by the Township Engineer.
- K. All proposed stormwater detention BMP(s) shall be located on land to be dedicated and accepted by a homeowners' association, the organization formed expressly for the maintenance of said BMP(s), or the Township.
- L. 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.

## **Article IV.        STORMWATER MANAGEMENT BMP(s)**

### **Section 401   Storm Sewer Pipe**

The following is a list of acceptable pipes for use in the Township:

- (a) Reinforced concrete pipe (RCP), ASTM C76 Class III and Class IV.
- (b) Corrugated polyethylene (PE) culvert pipe, AASHTO-M294 and Type S.
- (c) Polyvinyl chloride (PVC) pipe, AASHTO-M304.
- (d) Corrugated galvanized steel pipe AASHTO-M245 Type I, AASHTO-M2465 and AASHTO-M218, Type C-10 mil coating on both surfaces, where diameter of pipe is 60 inches or more.

- (e) Corrugated aluminum alloy pipe AASHTO-N 196, Type I, where diameter of pipe is 60 inches or more.
- (f) Corrugated aluminum alloy pipe-arch AASTTO-MI96 type where diameter of pipe is 60 inches or more.
- (g) Pipe constructed using other materials may be considered provided said pipe is specified in Penn DOT Form 408 latest edition and approved by the Township Engineer.
- (h) A minimum fifteen-inch diameter pipe shall be installed for all storm sewers to be maintained by the Township.

**Section 402 Stormwater Inlets**

Stormwater inlets located in the street paving shall conform to the construction standard in Drawing No. 8.2 (SS-05), Type M Inlet Detail. Stormwater inlets shall be placed at all low points, at street intersections and at points along both sides of the street to ensure adequate drainage, but in no case shall the distance between stormwater inlets along the street exceed 300 feet unless approved by the Township Engineer. Stormwater inlets at street intersections shall be placed on the tangent and not on the curved portion. Additional inlets shall be constructed in areas as may be directed by the Township Engineer during construction to provide for proper control of surface water.

- A. Grates and frames shall be structural steel, bicycle safe, and conform to Drawing No.8.2.1 (SS-05A and SS-05B).
- B. Stormwater inlets (SS-05), (SS-O6) and (SS-14A) shall be modified to accommodate larger diameter pipe as per Drawing Nos. 8.2.2, 8.2.2a and 8.2.2b.
- C. Ladder bars. Plastic ladder bars shall be installed in all inlets exceeding a depth of 5 feet, and shall be in accordance with PennDOT Publication No. 72, Drawing No. RC-34.
- D. A poured concrete invert shall be formed in the base of all inlets to provide full drainage out of and through the structure.
- E. Stormwater inlets located at street intersections shall be located at the end of the radius on the tangent.
- F. All streets and roads having a sag in the vertical alignment, where the slope grade of the pavement is less than 1% for 50 feet prior to the low-point inlets, shall have an additional inlet installed on both sides of said low-point inlets in order to prevent water from ponding on the pavement.

**Section 403 Stormwater Manholes**

All manholes shall be precast concrete constructed in accordance with the construction standards in Drawing No. 8.3 (SS-08), Typical Storm Sewer Manhole, and Drawing No. 8.3.1 (SS-07), Standard Manhole Frame and Cover. Manholes shall be installed at all changes in alignment and grades of storm sewers as may be directed by the Township Engineer to provide for proper maintenance. If maintenance is not a problem, pipe may be installed on a curve provided the deflection angle of the pipe joint does not exceed the manufacturer's specifications. See Drawing No. 8.3.3 (SS-09) for pipes under 48 inches in diameter and Drawing No. 8.3.2 (SS-10) for pipes over 48 inches in diameter. Inlets may be substituted for manholes where approved by the Township Engineer.

#### **Section 404 Maximum Distance Between Structures**

The maximum distance between structures (inlets or manholes) shall be 300 feet unless otherwise approved by the Township Engineer.

- A. Yard drains (SS-11). Yard drains shall be precast concrete constructed in accordance with the construction standards in Drawing No. 8.4.1. The top unit may be substituted with Type M tops, if approved by the Township Engineer.
- B. Special underdrains (SS-12). Special underdrains shall be installed in accordance with the standard in Drawing No. 8.4.2. The type of underdrain installed shall be as directed by the Township Engineer.
- C. Inlet connections (SS-03). All connections to existing inlets shall be in accordance with Drawing No. 8.5.

#### **Section 405 Storm Sewer Lateral Connection**

All storm sewer lateral connections shall be made in accordance with applicable law. All storm sewer lateral connections shall be located at manholes, inlets or at locations approved by the Township Engineer or his designated representative. All storm sewer laterals or runs designed to collect and/or connect to individual residential dwelling roof drains shall be smooth lined HDPE (high density polyethylene pipe).

#### **Section 406 Township Design Requirements For Stormwater Management**

##### **A. General Requirements**

- 1. The design criteria are intended to elaborate on the Township Code, such as Ordinances 87 GRADING, 89 SUBDIVISION & LAND DEVELOPMENT, 90 ZONING, and 114 UNIFORM CONSTRUCTION CODE, and to compliment the Stormwater Management Act, P.L. 864, No. 167. Said act requires that actions be taken:
  - a. To assure that the maximum rate of storm water runoff is no greater after development than prior to development activities; or

- b. To manage the quantity, velocity and direction of resulting stormwater runoff in a manner which otherwise adequately protects health and property from possible injury.
  - c. Stormwater management design and construction will conform in general to the applicable recognized national and state acts, manuals, and references such as the PA Stormwater Management Act and Penn DOT published forms.
2. All storm water management plans shall be designed and certified by individuals registered in the Commonwealth of Pennsylvania and qualified to perform such duties.
  3. Where applicable stormwater management BMP(s) shall comply with the requirements of Chapter 105 (Dam Safety and Waterway Management) of Title 25, Environmental Protection, of the Pennsylvania Department of Environmental Protection (DEP), and Section 404 of the Clean Water Act as authorized by the U. S. Corps of Engineers.
  4. Stormwater management BMP(s) that involve a state highway shall be subject to the approval of the Pennsylvania Department of Transportation.
  5. Stormwater runoff from a project site shall flow directly into a natural watercourse or into an existing storm sewer system, or onto adjacent properties in a manner similar to the runoff characteristics of the predevelopment flow.
  6. Stormwater runoff shall not be transferred from one watershed to another unless the watersheds are subareas of a larger watershed that are tributary to a common point of interest within or near the perimeter of the property. Transfer of runoff from one watershed to another under any other circumstances shall only be approved at the discretion of the Township. Documentation shall be provided that peak flow rates are not increased following development and there will be no detrimental impact in downstream areas.
  7. All stormwater runoff flowing over the project site shall be considered in the design of the stormwater management BMP(s).
  8. For any stormwater management BMP(s) requiring a permit to be issued by the DEP, said permit along with supporting report and plans used to secure the permit shall also be submitted.

## **B. Stormwater Management Standards**

1. Design storms.
  - a. Stormwater management BMP(s) on all development sites shall control the peak stormwater discharge for the two-, ten- and one-hundred-year design storms. For developments larger than three acres, the SCS twenty-four-hour, Type II Rainfall Distribution shall be used for analyzing stormwater runoff in predevelopment and post-development conditions, as well as for designing runoff control facilities (except storm runoff collection and conveyance facilities). For development sites less than 3 acres, the Rational Method may be utilized to determine peak

flows and the Modified Rational Method used for design and routing of runoff control facilities. The rainfall data to be used for SCS TR-55 computations in Daugherty Township are:

<b>Design Storm Return Period</b>	<b>24-Hour Rainfall Depth in Inches</b>
2-year	2.32
10-year	3.33
100-year	4.73

(NOTE: For additional information or data on other return periods, consult the Rainfall Duration Frequency Tables for Pennsylvania, produced by PA DEP, Office of Resource Management, Bureau of Dams and Waterways, Management, Division of Stormwater Management, Harrisburg, February 1983, or its most recent update.)

- b. If the Rational Method is used, the Region No.1, Pennsylvania Rainfall Intensity - Duration - Frequency Chart shown in the Pennsylvania Department of Transportation, Design Manual, Part 2, July 1986, shall be used to determine the rainfall intensity in inches per hour. See chart in Appendix D.
2. Where, in the judgment of the Township Engineer, the additional volume of stormwater runoff associated with a proposed development site will have a detrimental impact on downstream properties, and/or an existing downstream flood problem is documented, postdevelopment peak flows may be required to be reduced to less than predevelopment peak flows. Under these circumstances, acceptable peak flow rates will be determined at the discretion of the Township Engineer for a given storm event(s) based on exiting downstream restrictions. Additional hydrologic studies or analyses may also be required.
3. Calculation methods.
  - a. Development sites. For the purposes of computing peak flow rates, runoff hydrographs and storage requirements for development sites, either the SCS Soil Cover Complex Method as presented in the most recent version of Technical Release 55 (TR-55) shall be used, or the Rational Method as specified in Section 406.B.1. When the Rational Method is used, the technical data at the end of this chapter shall be used to determine rainfall intensities, time of concentration, and runoff coefficients. The use of alternative hydrologic methodologies may be approved by the Township Engineer if sufficient justification and documentation of their application is provided.
  - b. Stormwater collection conveyance facilities.
    - (1) For the purpose of designing storm sewers, open swales and other storm water runoff collection and conveyance facilities, the Rational Method shall be utilized. Rainfall intensities for design should be obtained from the Pennsylvania Department of Transportation rainfall charts in Appendix C through G. The design storm for storm sewers and swales that will discharge to detention facilities is the one-hundred year storm. The ten-year design storm for storm systems discharging to detention facilities shall be acceptable, provided it can be

documented that runoff exceeding the ten-year capacity of the storm system during a one-hundred-year storm event will ultimately discharge to the detention facility by alternative means, without endangering public safety or damaging private property. The design storm for all other onsite storm sewers or swales is the ten-year storm event, providing that larger storm events will not impact private property. Calculation sheets must be submitted. For storm inlets with multiple inflow pipes and/or bends where energy losses will be significant, inlet control conditions at the entrance to the outflow pipe shall be a design consideration to determine capacity.

- (2) All stormwater collection and/or conveyance systems routing water through or around the development site shall be designed for the one-hundred year storm event, unless it can be documented that said facilities will not create a hazard. A drainage easement shall be provided to contain and convey the one-hundred-year flood event throughout the project site, beginning at the furthest upstream property line of the proposed development in the watersheds.
- c. Predevelopment conditions. The cover type for all sites will be considered to be woods with light underbrush in good hydrologic conditions at the time of proposed development. All hydrologic parameters used to calculate peak flow rates shall use the appropriate coefficients pertaining to these conditions, as recommended in the hydrologic methodologies noted in Section 406.B.3.a.
- d. Postdevelopment conditions. The hydrologic parameters used to develop peak flow rates shall be reflective of anticipated soil runoff characteristics following grading and development of the site.
4. Stormwater management BMP(s). Peak runoff rates for all areas within or impacting the project site shall be determined and considered in the design of stormwater management BMP(s). These calculations shall be based on land use, time of concentration and other standard hydrologic parameters.
5. Allowable release rates. The allowable release rates from stormwater management BMP(s), or a development site in general, shall be less (as per Section 406.B.2) than or equal to the predevelopment peak runoff rates generated for the site. All stormwater runoff discharged from the site that is not controlled by a stormwater management BMP(s) shall be accounted for in the determination of the allowable release rates for the full range of storm events.
6. Joint development of control systems. Stormwater control systems may be planned and constructed in coordination by two or more developments so long as they are in compliance with Section 406.
7. Small developments. A small development shall be defined as a site that creates less than 5,000 square feet of impervious surface, and shall be exempt from the preparation of a detailed stormwater management plan as specified in Section 406.C. However, such developments must still provide safe management of stormwater runoff in accordance with the standards of this article and as approved by the Township.

- a. Applications for small developments shall include a plan that describes, narratively and graphically, the type and location of proposed on-site stormwater management techniques or the proposed connection to an existing storm sewer system.
- b. Runoff calculations, as required at the discretion of the Township, shall be prepared in accordance with the standards of this article.
- c. The Township shall review and approve the proposed provisions for stormwater management for a small development.

### **C. Stormwater Management Plan**

#### **1. General requirements:**

- a. No final subdivision or land development plan shall be approved, no permit authorizing construction issued, or any earthmoving or land disturbance activity initiated until the final stormwater management plan for the development site is approved in accordance with the provisions of this article.
- b. A letter from the Beaver County Conservation District (BCCD) approving the erosion and sedimentation control plan must also be received prior to the initiation of any grading. In the event that submission to the BCCD is not required by the Township, an erosion and sedimentation control plan prepared in accordance with the most recent version of PA DEP Chapter 102, Erosion and Sedimentation Control Program Manual, must be approved by the Township.
- c. Recording of Approved Operations and Maintenance Program and Related Agreements. The owner of any land upon which permanent stormwater facilities will be placed, constructed or implemented, as described in the Operations and Maintenance Plan, shall record the following documents in the Office of the Recorder of Deeds for Beaver County, within 30 days of approval of the Stormwater Management Plan by the Township:
  - (1) The Stormwater Management Plan, or a summary thereof,
  - (2) Operations and Maintenance Program Agreements under Section 406C.2.c.(6).(e), and
  - (3) Easements under Section 406.C.5.
  - (4) The Township may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this Section.
- d. Exemptions. The following activities are specifically exempt from this article:
  - (1) Use of land for gardening primarily for home consumption.

- (2) Use of land for construction of landscaping improvements, provided such improvements do not significantly alter the runoff characteristics for the land.
  - (3) Agricultural use of lands when operated in accordance with a farm conservation plan approved by the local soil conservation district, or when it is determined by the local soil conservation district that such use will not cause excessive erosion and sedimentation.
2. Stormwater management report. A written and bound report shall be submitted including, but not necessarily limited to the following information.
- a. Proposed name or identifying title of project, the name and address of the landowner and developer of the project site, as well as the name, address, and phone number of the consultant who prepared the stormwater management plan.
  - b. Stormwater management report date and date of the latest revision to the report.
  - c. Typewritten narrative report that should include sections describing the following items:
    - (1) Stormwater management report date and date of the latest revision to the report.
    - (2) Typewritten narrative report that should include sections describing the following items:
      - (a) Stormwater management plan objectives.
      - (b) Hydrologic procedures used to develop plan.
      - (c) Description(s) of predevelopment watershed conditions.
      - (d) Description(s) of postdevelopment watershed conditions.
      - (e) Description(s) of proposed plan and method(s) to handle postdevelopment runoff.
      - (f) Description(s) of proposed detention facility(s) and proposed outlet control.
      - (g) Summary tables for predevelopment and postdevelopment peak flows, detention facility(s) allowable release rates, stage storage outflow characteristics and storm-routing results.
    - (3) Watershed maps delineating predevelopment and postdevelopment watershed boundaries as well as the flow path and segments used to determine time of concentrations for each watershed.
    - (4) All hydrologic and hydraulic computations associated with the stormwater management plan, appended and referenced in the narrative.
    - (5) Storm sewer calculations and watershed map delineating all subareas used to size and compute flow for the storm sewer system.

- (6) **Operation and Maintenance Program.** The report shall contain a proposed maintenance plan for all stormwater control BMP(s), in accordance with the following:
- (a) Identify the proposed ownership entity (e.g., Township, property owner, homeowners' association, other management entity.)
  - (b) A maintenance program for all BMP(s), outlining the type of maintenance activities, probable frequencies, personnel and equipment requirements, and estimated annual maintenance costs for the continuing operation and maintenance of all permanent stormwater BMP(s), as follows:
    - i. 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 Township, stormwater facilities may also be dedicated to and maintained by the Township;
    - ii. 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 BMP(s) shall be the responsibility of the owner or private management entity.
    - iii. The Township shall make the final determination on the continuing operations and maintenance responsibilities. The Township reserves the right to accept or reject the operations and maintenance responsibility for any or all of the stormwater BMP(s).
  - (c) The property owner shall sign an Operations and Maintenance Program Agreement with the Township covering all stormwater facilities that are to be privately owned. The agreement shall be substantially the same as the agreement in Appendix B of this Ordinance.
  - (d) Other items may be included in the agreement where determined necessary to guarantee the satisfactory operation and maintenance of all permanent stormwater BMP(s). The agreement shall be subject to the review and approval of the Township.
  - (e) On or before the issuance of any permits by the Township, and on or before the signing of any operations and maintenance agreement by the Township, and for so long as any Stormwater BMP(s) shall remain in existence and be necessary for the collection, distribution, or storage of stormwater, the developer, landowner, or designated agent shall provide and maintain financial security to assure compliance with all applicable laws and regulations and the provisions of this Ordinance of such type and in such amount as the Township Supervisors shall from time to time prescribe.
  - (f) A note shall be placed on the recorded plan: "As per the approved stormwater management plan, the Township shall have right of access to the on-site detention facility for the right of maintenance in the event the owner, assigns or heirs do not adequately maintain the facility. The owner, assigns or heirs shall reimburse the Township for all costs associated with said maintenance. The aforementioned rights granted the Township in no way diminish the

responsibility of the owner, assigns or heirs of said maintenance, and no liability will be assumed by the Township associated with required access for maintenance purposes."

3. A copy of the proposed erosion and sedimentation control narrative and plans shall be submitted to the Township. The narrative and accompanying plans shall also be submitted to the Beaver County Conservation District for review and approval.
4. Stormwater controls. All proposed stormwater runoff control measures must be shown on the development site plans, including methods for collecting, conveying and storing stormwater runoff on-site. The preliminary plan should provide information on the general type, location, sizing, etc., of all proposed BMP(s) and their relationship to the existing watershed drainage system.
5. Easements, rights-of-way, deed restrictions. Stormwater management easements shall be provided by the property owner or developer for access for inspections and maintenance, or the preservation of stormwater runoff conveyance, infiltration, and detention areas and other BMP(s), by persons other than the property owner. The purpose of the easement shall be specified in any agreement under Section 406.C.2.c(6)(e). Stormwater management easements are required for all areas used for off-site stormwater control, unless a waiver is granted by the Township Engineer. All existing and proposed easements and rights-of-way for drainage and/or access to stormwater control BMP(s) shall be shown and the proposed owner identified. Drainage easements shall be delineated and recorded for all permanent BMP(s), swales and storm sewers to identify their permanency and provide maintenance access. Any areas subject to special deed restrictions relative to or affecting stormwater management on the development site shall be shown.
6. Permits/approvals. A list of any permits/approvals relative to stormwater management that will be required from other governmental agencies (e.g., an obstructions permit from PA DEP) and anticipated dates of submission/receipt should be included with the plan submission. Copies of applications may be requested by the Township. All stormwater or drainage-related computations or reports associated with these permit applications shall be submitted to the Township for reference and for review.
7. One-hundred-year floodplain delineation.
  - a. Stormwater management BMP(s) located with or affecting the floodplain of any watercourse shall also be subject to the requirements of Ordinance 69, Floodplain Management, as amended from time to time, which regulates construction and development within areas of the Township subject to flooding.
  - b. The one-hundred-year floodplain must be delineated on all plans for all watercourses which have a watershed area of 150 acres or greater. Where, in the judgment of the Township, private property or public BMP(s) may be adversely affected by the proposed activity, the one-hundred-year floodplain shall be established for any watercourse.
  - c. The one-hundred year floodplain shall be delineated by one of the following methods:

- (1) The FIS study by the Federal Emergency Management Agency (FEMA).
  - (2) A hydrologic report prepared by an individual registered in the Commonwealth of Pennsylvania to perform such duties. Calculations and channel hydraulic characteristics used to determine floodplain limits shall be provided.
8. Municipal liability disclaimer. Approval of a stormwater management plan by the Township shall not be construed as an indication that said plan complies with the requirements, laws, or standards of any agency of the Commonwealth, which may or may not govern said activity.

#### **D. Design Criteria For Stormwater Detention Facilities**

The following criteria shall be utilized for the design of proposed detention facilities.

1. Detention facilities shall be designed such that the postdevelopment peak runoff rates from the developed site are controlled at levels consistent with the allowable release rates determined for the two-, ten- and one-hundred-year design storms.
2. All detention facilities shall be equipped with outlet structures to provide discharge control for the two-, ten- and one-hundred-year storm events. Provisions shall also be made for auxiliary structures that are capable of passing the postdevelopment one-hundred-year storm peak runoff flows, presuming blockage of all lower flow controls, without damaging the facilities.
3. Shared storage facilities, which provide stormwater detention for more than one development site, will be encouraged. Such facilities shall meet the design criteria contained in this section. Runoff from the development sites involved shall be conveyed to the facility in a manner so as to void adverse impacts, such as flooding or erosion, to channels and properties located between the development site and the shared storage facilities.
4. Where detention facilities are used, the design of multiple-use facilities, such as ballfields or similar recreational uses, are encouraged wherever feasible.
5. As a general rule, detention facilities will be designed as dry basins, although wet facilities will be considered in specific situations where they can be shown to represent a significant amenity to the development and/or the Township. Facilities should be designed to induce water depths as shallow as possible.
6. Except in approved wet basins, stormwater detention basins will be designed to drain completely. A low-flow channel shall be installed to facilitate the conveyance of storm sewer flows to the basin outlet during frequent storm events. All interior portions of the basin will slope toward the outlet or low-flow channel at a minimum slope of 1%. (Drawing No. 8.7.4.6)(SW-04). All impoundment areas shall be adequately underdrained to prevent long term ponding of water.

7. Detention facility outfall pipes shall have a minimum of two antiseepage collars installed along the profile of the pipe. Antiseepage collars shall be constructed of reinforced concrete. (Drawing No. 8.7.4.7)(SW-05).
8. All detention facilities designed with an earthen dam shall provide a minimum of one foot of freeboard between the peak emergency spillway design flow elevation and the top of the embankment.
9. Where emergency spillways cannot be excavated into the existing undisturbed ground, they shall be designed and constructed with an approved geotextile fabric lining under the riprap. All riprap spillways shall be provided with a concrete cutoff wall at the spillway design crest elevation (Drawing No. 8.7.4.9) (SW-06.)
10. All embankments shall be designed according to sound engineering practice for such structures and must meet the approval of the Township. Facilities with a design water depth in excess of 10 feet may require a supporting report from a geotechnical engineer. In general, impoundment areas shall be designed to be contained within areas excavated within existing ground, rather than fill, whenever possible. Impoundment areas designed within fill shall require a supporting report from a geotechnical engineer addressing potential infiltration concerns and recommended solutions.
11. The outside slopes of the embankment shall not exceed three horizontal to one vertical. The interior slopes of the structure within the pool area shall not exceed a slope of three horizontal to one vertical. Design of facilities with flatter slopes for aesthetics and as a maintenance consideration are encouraged (Drawing No. 8.7.4.11)(SW-01). Crest of the embankment shall have a minimum width of not less than 10 feet.
12. The embankment shall be level along the crest and along the longitudinal centerline. In the event that the embankment would be overtopped by stormwater runoff, the flow over the crest and down the downstream slope would be sheet flow rather than being concentrated and eroding away the embankment. No trees shall be planted on the embankment. Should any type of protective fence be placed around the impoundment, the fence shall not be placed on the embankment or across the primary or emergency spillways.
13. Except where special erosion protection measures are provided, all disturbed areas will be graded evenly, topped with four inches of topsoil, fertilized, seeded and mulched by methods consistent with Penn DOT Publication 408.
14. All outfalls to and from the facility shall be provided with end walls and erosion control measures as per Section 409 (Drawing No. 8. 10a) (SS-02) and (Drawing No. 8. 10b) (SS-04).
15. Outlet control structures shall be constructed of reinforced concrete (cast-in-place or precast) and shall be recessed into the embankment wherever practical (Drawing No. 8.7.4. 15a) (SW-02). Trash racks for low-flow control openings should be designed to provide four to 10 times the area of the low-flow opening and facilitate debris removal and maintenance. (Drawing No., 8.7.4.15b)(SW-03)

16. An access easement with a minimum width of 20 feet to all stormwater detention facilities shall be provided to the Township. This access shall be improved with a cartway having a minimum width of 10 feet and a maximum grade of 15%. The access easement shall include a statement on the recorded plan from the owner/operator of the facility granting access to the Township as noted in Section 406.C.5.
17. Detention facilities that are designed as sedimentation facilities during construction operations shall be desilted and regraded to original design dimensions and have all temporary sedimentation-control devices removed prior to their conversion to detention facilities. Low-flow channels and underdrains should be installed with the conversion of the facility.
18. In subdivisions or projects that are constructed in phases with individual detention facilities employed as sedimentation basins, said facilities shall be converted to their ultimate use as stormwater management facilities as soon as their tributary areas are stabilized per BCCD standards. This conversion may be requested by the Township, with supportive corroboration from the Beaver County Conservation District, and shall be implemented as outlined in the approved erosion and sedimentation control plan.
19. An as-built drawing shall be required for each stormwater detention facility constructed. The drawing shall represent certification of the volume of the facility and the depth-versus-storage relationship, as well as the elevational relationships and dimensions of flow controls, including emergency spillways, as appropriate. These relationships shall be shown on the drawing in table form or in report form. In the event that these relationships vary from the computations provided in the approved plan, revised storm routings may be required at the discretion of the Township. The as-built drawing shall be stamped by a registered professional engineer or surveyor and submitted to the Township within 60 days of the completion of the facility. No facility will be approved until this as-built drawing has been approved by the Township.

**E. Design Criteria For Collection/Conveyance Facilities**

1. As a general rule, no stormwater may be discharged to unprotected areas such as hillsides or fills without special erosion and/or energy dissipation controls being installed. Stormwater shall either be conveyed to the nearest established stream channel as approved by the Township, or provided with an approved energy dissipation device. Conveyance shall be by pipe or erosion-protected ditch.
2. The design for culverts, pipes, and other stormwater conveyance structures shall be consistent with the design of the other stormwater management facilities. In the event that these structures are to be permitted by the PA DEP or Penn DOT, the design criteria required by the state agency shall be utilized.
3. All sites shall be graded to provide drainage away from and around structures to prevent potential flooding damage.

4. Collection/conveyance facilities should not be installed parallel to or close to the top or bottom of major embankments to avoid the possibility of embankment failure, with the exception of those facilities specifically designed to prohibit stormwater runoff from eroding slopes or preventing runoff from damaging downstream properties.
5. Stormwater shall be collected and conveyed from upslope areas in a manner designed to prevent damage to downslope property(s) consistent with appropriate engineering standards. This system shall be identified by permanent easements with the party responsible for maintenance identified.

#### **F. Disposal Of Stormwater From Roof, Foundation And Driveway Drains**

1. Individual lots that are required to provide for on-lot stormwater management BMP(s) per the stormwater management plan shall be identified on the recorded plan(s) for the subdivision.
2. No roof, driveway or foundation drains shall be discharged onto the right-of-way of any street or the pavement of any street. They may be connected to the street stormwater collection system of pipes or inlets. All residential dwellings not connected to a private or public stormwater collection and management system shall install a stormwater containment and disposal system at the direction of the Township in accordance with Drawing No. 8.7.6.2 (SS-13 and SS-13A). Other acceptable methods of disposal include underground tanks, infiltration devices, storm sewers, large-diameter pipe-chamber systems and grassed or other ground surfaces, provided adequate consideration is given to erosion protection, or any other method approved by the Township.
3. At no time will any roof, driveway, or foundation drains be allowed to be connected to the sanitary sewer line.
4. The use of splash blocks is permitted. The location of the splash-block discharge must be a minimum of five feet from foundations and five feet from the property line. Exceptions to this method may be permitted in the instance of townhouses or similar structures where common property lines exist. No stormwater runoff may be directed in such a manner as to disturb or damage neighboring properties.
5. Houses located on the low side of the road can use a solid pipe or corrugated pipe (minimum of four inches diameter) to the rear of the lot to a point of discharge onto a rock apron (size and dimensions to be specified) not less than 10 feet from the adjacent neighboring property line, provided said discharge has been accounted for within the approved stormwater management plan and the discharge does not impact downstream property owners.
6. Lots shall be graded in such a manner as to divert stormwater runoff away from adjacent property and structures consistent with appropriate engineering standards.

#### **G. Predevelopment Conditions**

1. For the purposes of calculating predevelopment peak flow rates, all sites will be considered to be woods with light underbrush in good hydrologic condition at the time of proposed development.

2. For the purposes of calculating predevelopment peak flow rates, all lands shall be considered to be in good hydrologic condition.

**H. Methods Of Calculations Of Runoff**

1. The methods of computation used to determine peak discharge and runoff shall be:
  - a. The USDA Soil Conservation Service Soil-Cover-Complex Method as set forth in the latest edition of Urban Hydrology for Small Watersheds, Technical Release No. 55, as published by SDCS, or the Rational Method, when approved by the Engineer for small sites.
  - b. The Rational Method of  $Q$  equals  $CIA$  where  $Q$  is the peak discharge of the watershed in cubic feet per second,  $C$  is the coefficient of runoff as per runoff coefficients found in Appendix F.  $I$  is the intensity of rainfall in inches per hour, and  $A$  is the area of watershed in acres. If the Rational Method is used, the overland velocity versus water course slope chart, Appendix E shall be used to determine the average overland velocity.
  - c. If the SCS 24-Hour, Type II Rainfall Distribution is used, the rainfall depths in inches for each of the design storms is shown below:

<b>Design Storm Frequency</b>	<b>Rainfall Depth In Inches</b>
2 Year	2.32
10 Year	3.33
100 Year	4.73

NOTE: For additional information or data on other return periods, consult Rainfall Duration Frequency Tables for Pennsylvania, published by PA DEP Office of Resource Management, Bureau of Dams and Waterways, Management, Division of Stormwater Management, Harrisburg, Pennsylvania, February, 1983 or its most recent update.

- d. If the Rational Method is used, the Region No.1, Pennsylvania Rainfall Intensity - Duration - Frequency Chart shown in the Pennsylvania Department of Transportation, Design Manual, Part 2, July 1986, shall be used to determine the rainfall intensity in inches per hour. See the chart in Appendix D.
2. Runoff calculations shall include a hydrologic and hydraulic analysis indicating volume and velocities of flow and the grades, sizes, and capacities of water carrying structures, sediment basins, retention and detention structures and sufficient design information to construct such facilities. Runoff calculations shall also indicate both predevelopment and postdevelopment rates for peak discharge of stormwater runoff from the project site.

**I. Design Standards For Water Carrying Facilities**

1. All storm sewer pipes, culverts and bridges (excluding detention and retention basin outfall structures) conveying water originating only from within the boundaries of the project site shall be designed for a ten-year storm event. All storm sewer pipes, culverts and bridges (excluding detention and retention basin outfall structures) conveying water originating from off-site shall be designed for the one-hundred-year storm event, unless it can be demonstrated that said facilities will not create a hazard. Natural drainage easement shall be provided to contain and convey the one-hundred-year frequency flood throughout the project site. Easements shall begin at the furthest upstream property line of the proposed development in a watershed.
2. The capacities of storm sewers and open swales or channels shall be computed from the Manning Equation.
3. Additional engineering analysis may be required by the Township Engineer.
4. Discharging stormwater off the property to an existing facility will require supporting calculations to prove the adequacy of the downstream facilities. The developer, subject to Township approval, may elect to upgrade downstream facilities to accommodate the generated runoff.
5. All storm sewer pipes, culverts, bridges, outlet structures and emergency spillways shall include a satisfactory means of dissipating the energy of flow at its outlet to assure conveyance of flow without endangering the safety and integrity of the downstream drainage area.

#### **J. Design Standards For Detention Facilities**

1. All detention facilities shall be equipped with outlet structures capable of providing discharge control for the two-, ten- and one-hundred-year storm frequencies. Provisions shall also be made for auxiliary structures, spillways and pipe that are capable of passing the postdevelopment one-hundred-year storm runoff flows without endangering the detention facilities.
2. All detention facilities constructed with earth embankments shall be designed and constructed with a minimum freeboard elevation of one foot between the peak emergency spillway design flow elevation and the top of the embankment.
3. All detention facility embankments shall have a minimum top width levee of 10 feet, interior slopes of not less than 3:1 and exterior slopes of not less than 2:1.
4. If the Rational Method is used, the design storm duration will be the one that requires the maximum storage. Such a storm will be determined by analyzing various rainfall durations to determine the maximum storage required.
5. A stage/discharge table for the detention facilities shall be provided.
6. A storage/elevation table for the detention facilities shall be provided.

7. Calculations, planimeter readings or other data to document storage/elevation table shall be provided.
8. All outlet structures and emergency spillways shall include a satisfactory means of dissipating the energy of flow at its outlet to assure conveyance of flow without endangering the safety and integrity of the basin and the downstream drainage area.
9. To ensure that the detention system will not become a health hazard or public nuisance, means shall be provided to drain the pond completely.

#### **K. Stormwater Management Plan Contents**

The following items shall be included as part of the stormwater management plan:

1. Written and bound report including the following information:
  - a. Proposed name or identifying title of project.
  - b. Name and address of the landowner and developer of the project site.
  - c. Name, address and phone number of the consultant who prepared the stormwater management plan.
  - d. Stormwater management report date and date of the latest revision to the report.
  - e. Typewritten narrative outlining the objectives of the proposed stormwater management plan.
  - f. Stormwater runoff calculations for both predevelopment and postdevelopment conditions.
  - g. If the maintenance responsibility for the detention system shall remain with the developer and his successor in title, a legal agreement will be recorded with the final plat to that effect.
  - h. An ownership and maintenance program that clearly sets forth the ownership and maintenance responsibility of all temporary and permanent stormwater management BMP(s) and erosion and sedimentation control facilities, including:
    - (1) Description of temporary and permanent maintenance requirements.
    - (2) Identification of a responsible individual, corporation, association or other entity for ownership and maintenance of both temporary and permanent stormwater management and erosion sedimentation control facilities.
    - (3) Establishment of suitable easements for access to all BMP(s).
    - (4) Establishment of a graded roadway from public highway to the detention facilities suitable for maintenance equipment access as per Sections 406.D.16 and 406 C.5.

**2. Plans showing the following information:**

- a. Proposed name or identifying title of project.
- b. Name of the landowner and developer of the project site.
- c. Name and address of consultant who prepared the stormwater management plan.
- d. Plan date and date of the latest revision to the plan.
- e. Location map. A key map showing the development site location at a minimum scale of 2,000 feet to the inch shall be provided.
- f. The names, locations and dimensions of streets, buildings, water courses, bodies of water, swales, drainage facilities, tree masses, significant trees, wetlands and other existing or proposed features on the site or which will be affected by runoff from the development.
- g. Existing and final contours with sufficient detail to show all stormwater surface drainage. The location of the benchmark and the datum used shall also be indicated.
- h. The boundaries of the watershed(s) and (where applicable) subbasin(s) as they are located on the development site and identify name(s) or number(s).
- i. The watershed and subbasin areas.
- j. Tract boundaries showing distances and bearings.
- k. Soil types and boundaries as designated by the USDA SCS Soil Survey of Beaver County.
- l. The location of the flow path utilized to estimate the predevelopment and postdevelopment time of concentration shall be shown and identification of each flow segment on the topographic plan.

**3. One-hundred-year floodplain delineation.**

- a. Stormwater management facilities located within or affecting the floodplain of any watercourse shall also be subject to the requirements of Ordinance 69, Floodplain Management, as amended from time to time, which regulates construction and development within areas of the Township subject to flooding.
- b. The one-hundred-year floodplain must be delineated on all plans for all watercourses which have a watershed area of 150 acres or greater. Where, in the judgment of the Township Engineer, private property or public facilities may be adversely affected by the proposed activity, the one hundred-year floodplain shall be established for any watercourse.

- c. The one-hundred-year floodplain shall be delineated by one of the following methods:
- (1) A hydrologic report prepared by the Federal Emergency Management Agency (FEMA).
  - (2) A hydrologic report prepared by an individual registered in the Commonwealth of Pennsylvania to perform such duties.
4. Township liability disclaimer. Approval of a stormwater management Plan by the Township shall not be construed as an indication that said plan complies with the requirements, laws or standards of any agency of the Commonwealth which mayor may not govern said activity.
  5. Outlet structures in detention basins. Outlet structures in detention basins shall be constructed with reinforced concrete, Drawing Nos. 8.7.4.15a (SW-02) and 8.7.5. (SD-08).
  6. Detention basin low-flow channels. Detention basin low-flow channels shall be constructed in accordance with Detention Basin Low Flow Channel, Drawing No. 8.7.4.6. (SW-04).
  7. Detention basin outlet pipes. Detention basin outlet pipes shall have two or more antiseep collars, Drawing Nos. 8.7.4.7 and 8.7.4.11. (SW-05 and SW-01).

**Section 407 Storm Sewer Trench (SS-01).**

All storm sewer pipes shall be installed in accordance with the standard in Drawing No. 8.8, Typical Storm Trench Detail, where located under all proposed pavements.

**Section 408 Cradles and reinforcements for sewers**

All cradles and reinforcements for sewers shall be approved by the Engineer.

**Section 409 Headwall/End Wall (SS-02).** Concrete headwalls and splash aprons shall be constructed in accordance with the construction standard in Drawing No. 8.10a, Standard Type D-2 End Wall Detail, at the outfall of all storm sewers. Where watercourses are piped and filled, concrete headwall and splash aprons shall be constructed at both ends of the pipe. Riprap shall be placed at end walls in accordance with Drawing No. 8.10b, Rip Rap Detail (SS-04).

- A. Rip rap. All rip rap used for outlet protection, bank stabilization or other means of protection shall be designed and installed in accordance with specifications outlined in Penn DOT Publications 408 and 72.

**Section 410 Concrete Encasement And Anchors For Sewers**

All concrete encasement and anchors for sewers shall be in accordance with Drawing No. 8.11, Concrete Encasement and Anchors for Sewers (SS-14), and approved by the Engineer.

**Section 411 Connections For Drop Manholes**

All connections for drop manholes shall be approved by the Engineer.

#### **Section 412 Design Criteria For Stormwater Collection/Conveyance Facilities**

For the purpose of designing storm sewers, open swales and other stormwater runoff collection and conveyance facilities, the Rational Method shall be applied. Rainfall intensities for design should be obtained from the Pennsylvania Department of Transportation Rainfall Charts. The design storm for storm sewers is 10 years. The design storm for storm sewer outfall channels is 10 years. Calculation sheets must be submitted, except as follows: where it is required to collect and convey the one-hundred-year event to the detention facilities, the storm sewers shall be sized as required to accommodate such an event without overflowing onto the ground surface and in compliance with Drawing No. 8.10b, Rip Rap Detail (SS-04).

#### **Section 413 Location Of Collection/Conveyance Facilities**

Collection/conveyance facilities should not be installed parallel and close to the top or bottom of a major embankment to avoid the possibility of damage to the facility due to embankment failure or of damage to the embankment due to facility failure.

#### **Section 414 Storm Sewer Outfall Channels And Drainage Swales**

Permissible velocities of various channel linings (vegetation, rock lined, rip-rap, gabions) Drawing No. 8.15 (SD-04) shall be in accordance with Chapter 4 of the Erosion and Sediment pollution Control Program Manual published by the Pennsylvania Department of Environmental Protection. Storm sewer outfall channels shall be trapezoidal or triangular shape with side slopes not to exceed two horizontal: one vertical (ratio). Storm sewer outfall channels shall be designed in accordance with Chapter 13 of the Pennsylvania Department of Transportation Design Manual Part 2 - Publication 13, Section 13.3, entitled "Watercourse Erosion Protection." Where drainage swales or open channels are used, they shall be suitably designed for ease of maintenance.

#### **Section 415 Springs**

Any springs encountered during construction shall be piped and connected to the storm sewer system or extended to a natural watercourse as may be approved by the Township Engineer.

#### **Section 416 Roof and foundation drains**

No roof or foundation drains shall be discharged on to the right-of-way of any street or the pavement of any street. They may be connected to the street stormwater collection system of pipes or inlets. All residential dwellings not connected to a private or public stormwater collection and management system

shall install a stormwater containment and disposal system in accordance with Drawing No. 8.7.6.2 (SS-13 and SS-13A).

**Section 417 Erosion and Sediment Control**

- A.** No Regulated Earth Disturbance activities within the Township shall commence until approval by the Township of an Erosion and Sediment Control Plan for construction activities.
- B.** Any earth disturbance activity of 5,000 square feet or more shall comply with the regulations issued by the Pennsylvania Department of Environmental Protection (DEP) requiring the preparation and approval of an erosion and sediment control plan, 25 Pa. Code § 102.4(b).
- C.** A DEP NPDES construction activities permit is required for any earth disturbance of one acre or more with a point source discharge to surface waters or the Township's storm sewer system, or five acres or more regardless of the planned runoff (hereinafter collectively referred to as "regulated earth disturbance activities"). This includes earth disturbance on any portion of, part of, or during any stage of, a larger common plan of development.
- D.** 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 Township. The issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit (PAG-2) satisfies the requirements Section 417.A.
- E.** 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 418 Prohibited Discharges**

- A.** No person in the Township shall allow, or cause to allow, stormwater discharges into the Township's separate storm sewer system which is not composed entirely of stormwater, except as provided in Section 418.B below and discharges allowed under a state or federal permit.
- B.** Discharges which may be allowed, based on a finding of the Township that the discharge(s) do not significantly contribute to pollution of surface waters of the commonwealth, are:
  - 1. Discharges from fire-fighting activities;
  - 2. Potable water sources including dechlorinated water line and fire hydrant flushings;
  - 3. Irrigation drainage;
  - 4. Routine external building washdown (which does not use detergents or other compounds);
  - 5. Air conditioning condensate;

6. Water from individual residential car washing;
  7. Springs;
  8. Water from crawl space pumps;
  9. Uncontaminated water from foundation or from footing drains;
  10. Flows from riparian habitats and wetlands;
  11. Lawn watering;
  12. 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;
  13. Dechlorinated swimming pool discharges; and
  14. Uncontaminated groundwater.
- C.** In the event that the Township determines that any of the discharges identified in Section 418.B above significantly contribute to pollution of waters of the commonwealth, or is so notified by DEP, the Township will notify the responsible person to cease the discharge.
- D.** Upon notice provided by the Township under Section 418.C hereof, the discharger will have a reasonable time, as determined by the Township, 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 419 Prohibited Connections**

The following connections are prohibited, except as provided in Section 418.B.

- A.** Any drain or conveyance, whether on the surface or subsurface, which allows any non-stormwater 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.
- B.** 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 Township.

#### **Section 420 Post-Construction Runoff Control Requirements**

- A. No regulated earth disturbance activities within the Township shall commence until approval by the Township of a plan which demonstrates compliance with state water quality requirements after construction is complete.
- B. DEP has regulations that require townships to ensure design, implementation and maintenance of best management practices facilities that control runoff from new development and redevelopment (hereinafter "development") after regulated earth disturbance activities are complete. These requirements include the need to implement post-construction stormwater BMP(s) with assurance of long-term operations and maintenance of those BMP(s).
- C. The BMP(s) must be designed to protect and maintain existing uses (e.g., drinking water use; cold water fishery use) 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, as required by statewide regulations at 25 Pa. Code Chapter 93 (collectively referred to herein as "state water quality requirements").
- D. To control post-construction stormwater impacts from regulated earth disturbance activities, state water quality requirements can be met by BMP(s), including site design, which provide for replication of preconstruction 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 (#392-0300-002, September 28, 2002), this may be achieved by the following:
  - 1. Infiltration: replication of preconstruction stormwater infiltration conditions;
  - 2. Treatment: use of water quality treatment BMP(s) to ensure filtering out of 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 scouring and erosion).
- 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 Township. The issuance of a NPDES construction permit [or permit coverage under the statewide general permit (PAG-2)] satisfies the requirements of Section 420.A.

## **Article V. INSPECTIONS AND RIGHT OF ENTRY**

### **Section 501 Inspections**

- A. DEP or its designees (e.g., County Conservation Districts) normally ensure compliance with any permits issued, including those for stormwater management. In addition to DEP compliance

programs, the Township or its designee may inspect all phases of the construction, operations, maintenance and any other implementation of stormwater BMP(s).

- B. During any stage of the Regulated Earth Disturbance activities, if the Township or its designee determines that any BMP(s) are not being implemented in accordance with this Ordinance, the Township may suspend or revoke any existing permits or other approvals until the deficiencies are corrected.

## **Section 502 Right of Entry**

- A. Upon presentation of proper credentials, duly authorized representatives of the Township may enter at reasonable times upon any property within the Township to inspect the implementation, condition, or operation and maintenance of the stormwater BMP(s) in regard to any aspect governed by this Ordinance.
- B. BMP(s) owners and operators shall allow persons working on behalf of the Township ready access to all parts of the premises for the purposes of determining compliance with this Ordinance.
- C. Persons working on behalf of the Township shall have the right to temporarily locate on any BMP(s) in the Township such devices as are necessary to conduct monitoring and/or sampling of the discharges from such BMP(s).
- D. Unreasonable delays in allowing the Township access to a BMP(s) is a violation of this Article.

## **Article VI. FEES AND EXPENSES**

### **Section 601 General**

The Township may charge a reasonable fee for review of BMP(s) Operations and Maintenance Plans to defray review costs incurred by the Township and shall establish this fee by Resolution. The Applicant shall pay all such fees.

### **Section 602 Expenses Covered by Fees**

The fees required by this Ordinance may cover:

- A. Administrative/clerical Costs
- B. The review of the BMP(s) Operations and Maintenance Plan by the Township Engineer.
- C. The site inspections including, but not limited to, pre-construction meetings, inspections during construction of stormwater BMP(s), 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.

### **Section 603 Township Stormwater Management Operation and Maintenance Fund**

- A. If stormwater BMP(s) are accepted by the Township for dedication, the Township may require persons installing stormwater BMP(s) to pay a specified amount to the Township Stormwater Management Operation and Maintenance Fund, to help defray costs of operations and maintenance activities. The amount may be determined as follows:
  - 1. If the facility is to be owned and maintained by the Township, the amount shall cover the estimated costs for operations and maintenance for fifteen (15) years, as determined by the Township.
  - 2. The amount shall then be converted to present worth of the annual series values.
- B. If a BMP(s) is proposed that also serves as a recreation facility (e.g. ball field, lake), the Township may adjust the amount due accordingly.

## **Article VII. ENFORCEMENT AND PENALTIES**

### **Section 701 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 702 Alteration of Stormwater Facilities**

- A. No person shall modify, remove, fill, landscape or alter any existing stormwater BMP(s), unless it is part of an approved maintenance program, without the written approval of the Township.
- B. No person shall place any structure, fill, landscaping or vegetation into a stormwater BMP(s) or within a drainage easement, which would limit or alter the functioning of the BMP(s), without the written approval of the Township.
- C. It shall be unlawful to alter or remove any permanent stormwater facility required by an approved stormwater management plan, or to allow the property to remain in a condition which does not conform to an approved facilities stormwater management plan, unless an exception is granted in writing by the Township.

### **Section 703 Enforcement Generally**

- A.** Whenever the Township finds that a person has violated a prohibition or failed to meet a requirement of any of the provisions of this Ordinance, the Township 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 discharges;
  3. Cessation of any violating discharges, practices or operations;
  4. The abatement or remediation of stormwater 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 BMP(s); and
  7. Operation and maintenance of stormwater BMP(s).
- B.** Failure to comply within the time specified shall also subject such person to the penalty provisions of this chapter. All such penalties shall be deemed cumulative and shall not prevent the Township from pursuing any and all other remedies available in law or equity.

### **Section 704 Suspension and Revocation of Permits and Approvals**

- A.** Any building, land development or other permit or approval for regulated earth disturbance activities issued by the Township may be suspended or revoked by the governing body for:
1. Noncompliance with or failure to implement any provision of the permit;
  2. A violation of any provision of this chapter; 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 Township when:
1. The Township Engineer or designee has inspected and approved the corrections to the stormwater BMP(s), or the elimination of the hazard or nuisance, and/or;
  2. The Township 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 Township cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this Ordinance.

**Section 705 Stop-Work Order**

- A. Notice to stop work. Upon notice from the Township that work on the installation of public or private improvements is being prosecuted contrary to the provisions of this Ordinance, such work shall be immediately stopped. The stop-work order shall be in writing and shall be given to the developer, or to the person doing the work. The stop-work order shall state the conditions under which the work may be resumed.
- B. Unlawful continuance. Any person who shall continue any work in or about a work site having been served with a stop-work order, except such work as that person is directed to perform to remove a violation or unsafe conditions, shall be liable for the violations and penalties set forth herein.

**Section 706 Enforcement Notice**

- A. It shall be unlawful for any developer, owner or public utility company to construct public or private improvements regulated by this Ordinance, or cause the same to be done, in conflict with or in violation of any of the provisions of this Ordinance.
- B. Enforcement notice.
  - 1. If any violation of this Ordinance has occurred, the Township shall initiate enforcement proceedings by sending an enforcement notice as provided in this section.
  - 2. The enforcement notice shall be sent to the owner of record of the parcel on which the violation has occurred, to any person who has filed a written request to receive enforcement notices regarding that parcel, and to any other person requested in writing by the owner of record.
  - 3. An enforcement notice shall state at least the following:
    - a. The name of the owner of record and any other person against whom the Township intends to take action.
    - b. The location of the property in violation.
    - c. The specific violation with a description of the requirements which have not been met citing in each instance the applicable provisions of this Ordinance.
    - d. The date before which the steps for compliance must be commenced and the date before which the steps must be completed.

- e. That the recipient of the notice has the right to appear to the Township Board of Supervisors within a prescribed period of time in accordance with procedures set forth in this Ordinance.
  - f. That failure to comply with the notice within the time specified unless extended by "appeal to the Township Board of Supervisors, constitutes a violation with possible sanctions clearly described.
- C. Any person who shall violate a provision of this Ordinance or who shall fail to comply with any requirement thereof shall be subject to the penalties of this Ordinance. Each day that a violation continues shall be a separate offense.
- D. Abatement of violation. The imposition of the penalties herein prescribed shall not preclude the Township from instituting appropriate action to prevent unlawful construction or to restrain, correct or abate a violation or to stop an illegal act.

**Section 707 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 than \$ 1,000.00 for each violation, recoverable with costs, or imprisonment of not more than 90 days in the Beaver County Jail or both. Each day that the violation continues shall be a separate offense.
- B. In addition, the Township, 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. Nothing contained in this section shall be construed or interpreted to grant any person or entity other than the Township the right to commence any action for enforcement pursuant to this section.

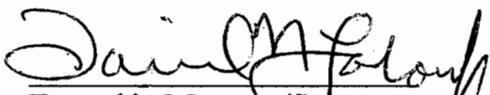
**Section 708 Appeals**

Any person aggrieved by any action of the Township 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.

**ORDAINED AND ENACTED into law this 9<sup>th</sup> day of March, 2005.**

Attest:

Township of Daugherty

  
 Dawn M. Falony  
 Township Manager/Secretary

  
 George J. Rossick  
 Chairman Board of Supervisors

## **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 minimize 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 \_\_\_\_\_, 20\_\_\_\_, by and between \_\_\_\_\_, (hereinafter the "Landowner"), and Daugherty Township, Beaver County, Pennsylvania, (hereinafter "Township");

**WITNESSETH**

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of Beaver County, Pennsylvania, Deed Book \_\_\_\_\_ at 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 Township (hereinafter referred to as the "Plan") for the property identified herein, which is attached hereto as Appendix A and made part hereof, as approved by the Township, provides for management of stormwater within the confines of the Property through the use of Best Management Practices (BMPs); and

WHEREAS, the Township, and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of the Township and the protection and maintenance of water quality require that on-site stormwater Best Management Practices be constructed and maintained on the Property; 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 Daugherty Township 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 Township requires, through the implementation of the Plan, that stormwater management BMPs as required by said Plan and the Township 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 BMP(s) 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 Township and in accordance with the specific maintenance requirements noted on the Plan.
3. The Landowner hereby grants permission to the Township, 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 Township 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 Township, the Township 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 Township to erect any permanent structure on the land of the Landowner. It is expressly understood and agreed that the Township 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 Township.

5. In the event the Township, 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 Township for all expenses (direct and indirect) incurred within 10 days of receipt of invoice from the Township.
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 Township'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 Township. In the event that a claim is asserted against the Township, its designated representatives or employees, the Township 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 Township's employees or designated representatives shall be allowed, the Landowner shall pay all costs and expenses regarding said judgment or claim.
8. The Township shall inspect the BMP(s) at a minimum of once every three years to ensure their continued functioning.

This Agreement shall be recorded at the Office of the Recorder of Deeds of Beaver 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)

For the Township:

\_\_\_\_\_

(SEAL)

For the Landowner:

\_\_\_\_\_

ATTEST:

\_\_\_\_\_, County of Beaver, Pennsylvania

I, \_\_\_\_\_, a Notary Public in and for the County and State aforesaid, whose commission expires on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, do hereby certify that \_\_\_\_\_ and \_\_\_\_\_ representing Daugherty Township whose name(s) is/are signed to the foregoing Agreement bearing date of the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, has acknowledged the same before me in my said County and State.

**GIVEN UNDER MY HAND THIS \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.**

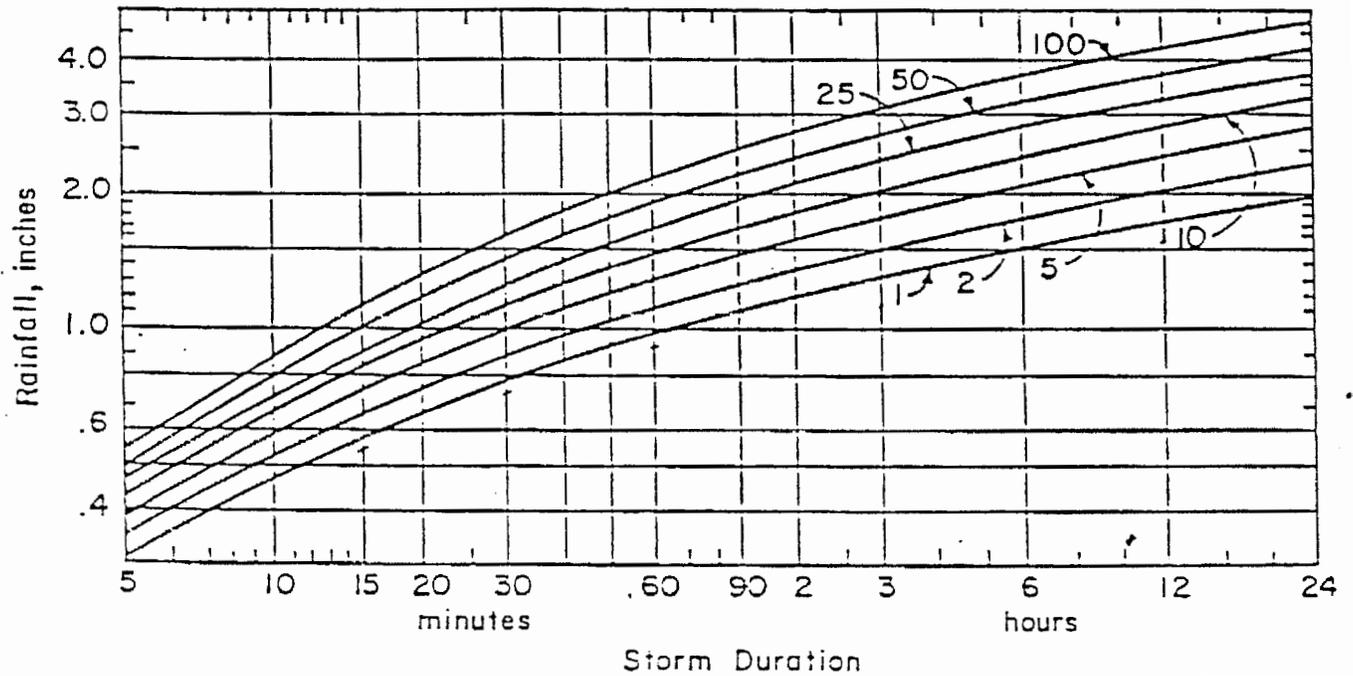
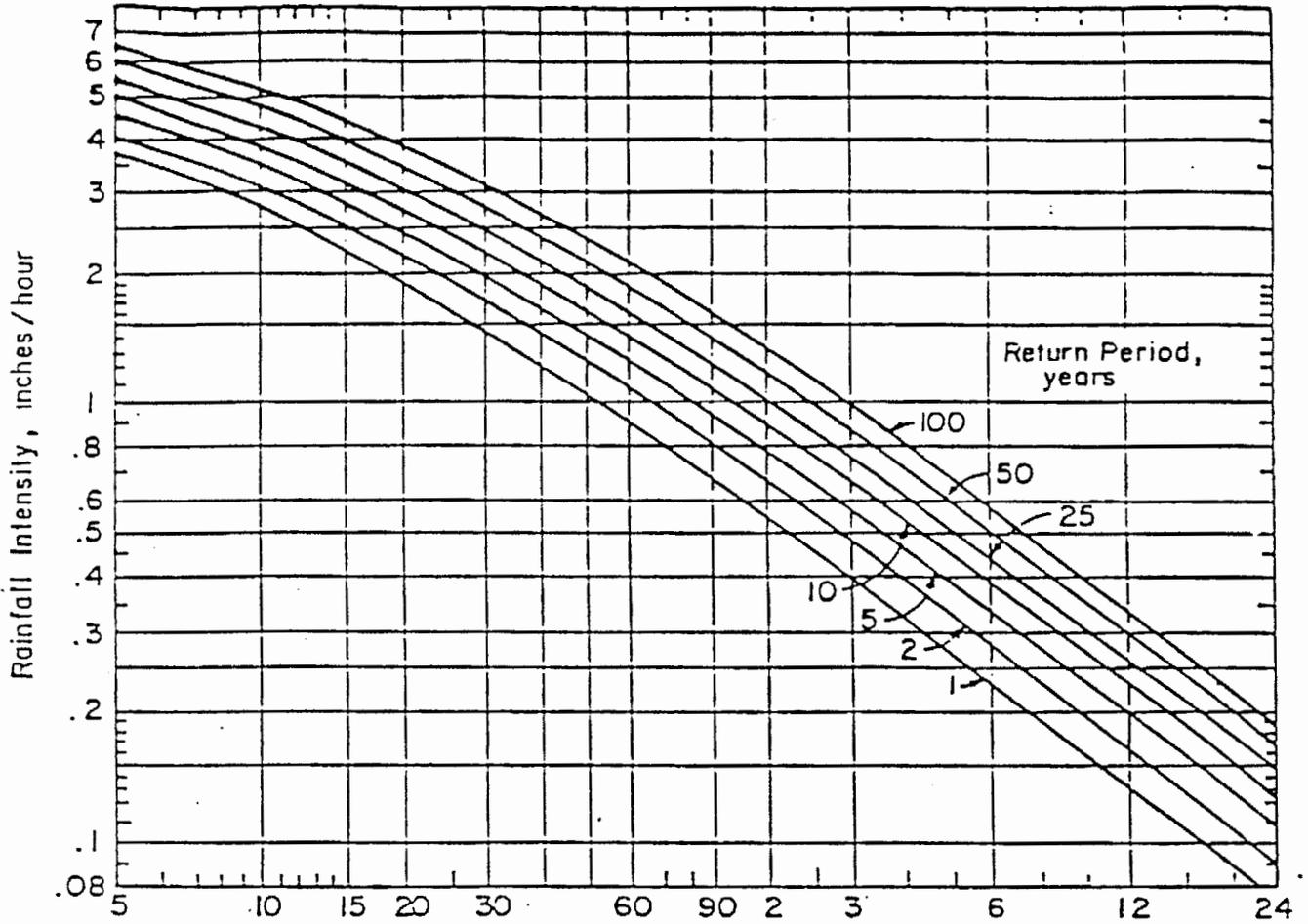
\_\_\_\_\_  
**NOTARY PUBLIC**

\_\_\_\_\_  
**(SEAL)**



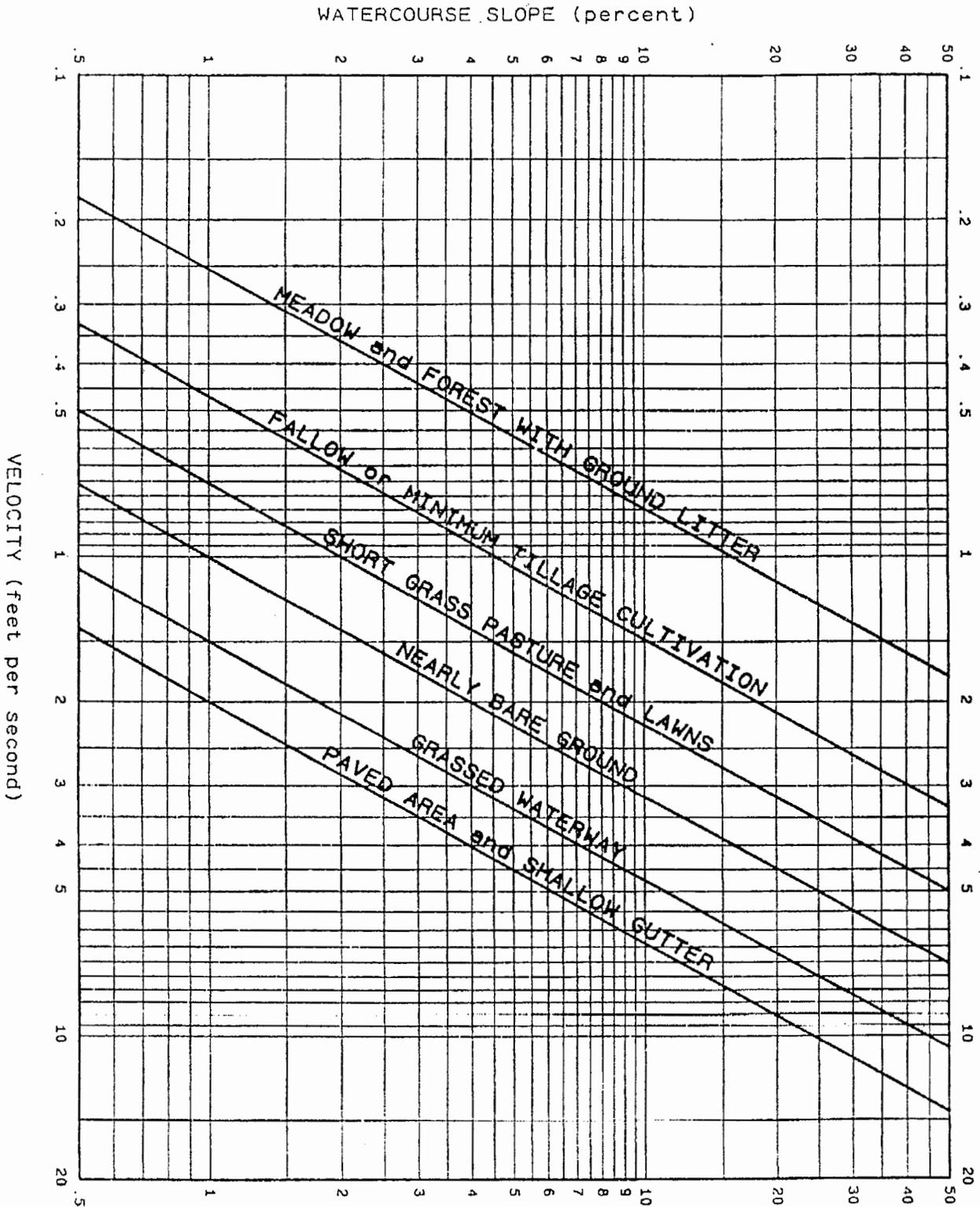
# Appendix D

## Design Storm Curves for Region 1



# Appendix E

## Overland Velocity vs. Watercourse Slope



## Appendix F

### Runoff Curve Numbers For Other Agricultural Lands

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

<sup>1</sup>Average runoff condition, and  $I_s = 0.2S$ .

<sup>2</sup>*Poor:* <50% ground cover or heavily grazed with no mulch.  
*Fair:* 50 to 75% ground cover and not heavily grazed.  
*Good:* >75% ground cover and lightly or only occasionally grazed.

<sup>3</sup>*Poor:* <50% ground cover.  
*Fair:* 50 to 75% ground cover.  
*Good:* >75% ground cover.

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

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

<sup>6</sup>*Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.  
*Fair:* Woods are grazed but not burned, and some forest litter covers the soil.  
*Good:* Woods are protected from grazing, and litter and brush adequately cover the soil.

## Appendix G

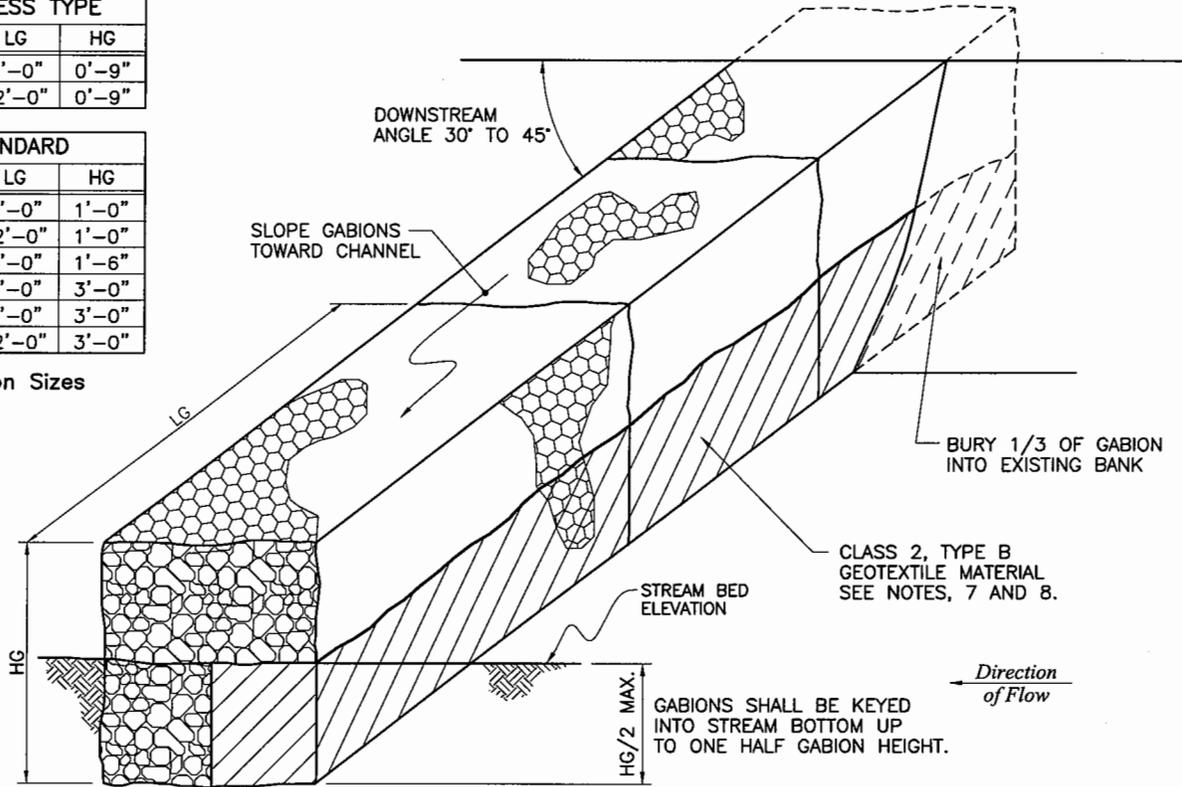
### Runoff Coefficients "C" for Rational Formula

Soil Group	A			B			C			D		
	Slope	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%
Land Use												
Cultivated Land												
winter conditions	.14	.23	.34	.21	.32	.41	.27	.37	.48	.34	.45	
summer conditions	.10	.16	.22	.14	.20	.28	.19	.26	.33	.23	.29	
Fallowed Fields												
poor conditions	.12	.19	.28	.17	.25	.34	.23	.33	.40	.27	.35	
good conditions	.08	.13	.16	.11	.15	.21	.14	.19	.26	.18	.23	
Forest/Woodland	.08	.11	.14	.10	.14	.18	.12	.16	.20	.15	.20	
Grass Areas												
good conditions	.10	.16	.20	.14	.19	.26	.18	.22	.30	.21	.25	
average conditions	.12	.18	.22	.16	.21	.28	.20	.25	.34	.24	.29	
poor conditions	.14	.21	.30	.18	.28	.37	.25	.35	.44	.30	.40	
Impervious Areas	.90	.91	.92	.91	.92	.93	.92	.93	.94	.93	.94	
Weighted Residential												
Lot size 1/8 acre	.29	.33	.36	.31	.35	.40	.34	.38	.44	.36	.41	
Lot size 1/4 acre	.26	.30	.34	.29	.33	.38	.32	.36	.42	.34	.38	
Lot size 1/3 acre	.24	.28	.31	.26	.32	.35	.29	.35	.40	.32	.36	
Lot size 1/2 acre	.21	.25	.28	.24	.27	.32	.27	.31	.37	.30	.34	
Lot size 1 acre	.18	.23	.26	.21	.24	.30	.24	.29	.36	.28	.32	

MATTRESS TYPE		
WG	LG	HG
6'-0"	9'-0"	0'-9"
6'-0"	12'-0"	0'-9"

STANDARD		
WG	LG	HG
3'-0"	6'-0"	1'-0"
3'-0"	12'-0"	1'-0"
3'-0"	9'-0"	1'-6"
3'-0"	6'-0"	3'-0"
3'-0"	9'-0"	3'-0"
3'-0"	12'-0"	3'-0"

Gabion Sizes



NOTES :

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, SECTION 626, GABIONS.
2. TYPE A GABIONS SHALL CONSIST OF WIRE-MESH BASKETS FILLED BY HAND PLACEMNET OF COARSE AGGREGATE, AT LEAST ALONG THE EXPOSED SURFACES, FOR A UNIFORM APPEARANCE.
3. TYPE B GABIONS SHALL CONSIST OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OR SMALL POWER EQUIPMENT PLACEMENT OF COARSE AGGREGATE.
4. CORROSION RESISTANT TYPE A AND TYPE B GABIONS SHALL BE THE SAME AS TYPE A AND TYPE B GABIONS EXCEPT THAT THE WIRE MESH SHALL BE SHEATHED IN POLYVINYL CHLORIDE PLASTIC.
5. THE APRON OR TOE WALL IS REQUIRED WHERE THE SLOPE WALL IS INSTALLED ADJACENT TO WATER. THE APRON SHOULD BE APPROXIMATELY TWO TIMES AS WIDE AS THE ANTICIPATED DEPTH OF SCOUR AND THE TOE WALL HEIGHT SHOULD BE AT LEAST EQUAL TO THE ANTICIPATED DEPTH OF SCOUR.
6. WHEN GABIONS ARE PLACED ON A 1-1/2:1 SIDE SLOPE OR STEEPER, DRIVE HARDWOOD STAKES THROUGH THE GABIONS, ALONG THE TOP EDGE, TO ANCHOR THE INSTALLATION. MINIMUM EMBEDMENT OF STAKES BELOW GABION BOTTOM SHALL BE 18 INCHES.
7. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND SECTION 735.
8. INSTALL GEOTEXTILE MATERIAL ALOGN ALL INTERFACE AREAS WITH GROUND CONTACT.

REFERENCE RC-43 - PENNDOT PUBLICATION 72

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

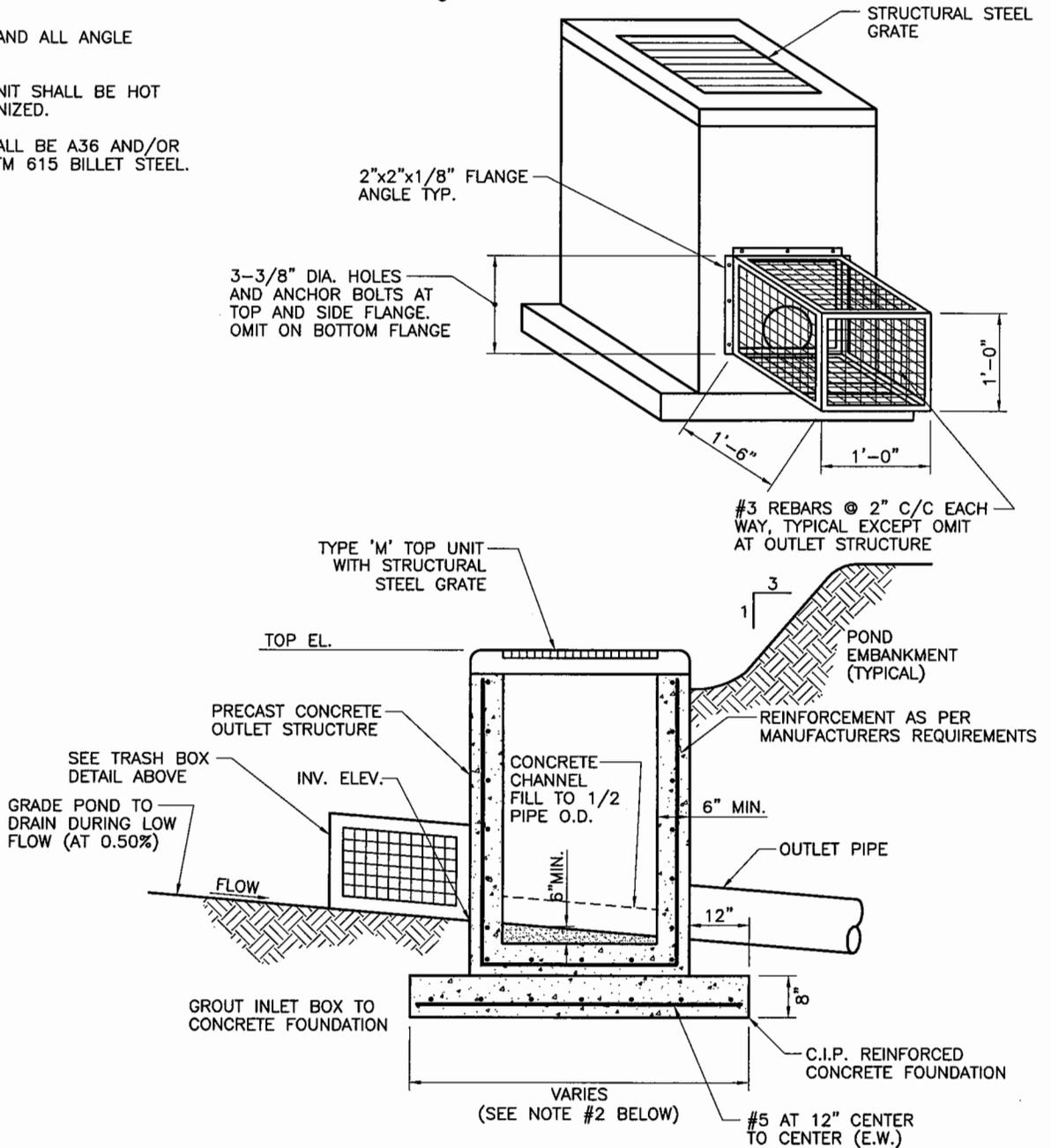
**Gabions Used for  
Channel Deflector**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SD-04</b> Date: 02/03/05

**NOTES :**

1. WELD REBAR AND ALL ANGLE CONNECTIONS.
2. COMPLETED UNIT SHALL BE HOT DIPPED GALVANIZED.
3. MATERIALS SHALL BE A36 AND/OR GRADE 60 ASTM 615 BILLET STEEL.

Drawing No. 8.7.5.



**NOTES :**

1. PROVIDE FIELD PLACED CONCRETE FILL IN THE BOTTOM OF ALL OUTLET STRUCTURES TO A DEPTH OF 1/2 OF THE PIPE I.D. PROVIDE AN ADEQUATE FLOW CHANNEL FOR THE TRANSITION TO THE OUTLET PIPE. SHAPE BOX BOTTOM FOR POSITIVE DRAINAGE.
2. CONSTRUCT THE REINFORCED CONCRETE FOUNDATION TO A DIMENSION 24" LARGER THAN THE OUTSIDE DIMENSION OF THE OUTLET STRUCTURE.
3. TRASH BOX TO BE PROVIDED AT INFLOW OPENING OF THE OUTLET STRUCTURE.

NOT TO SCALE

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

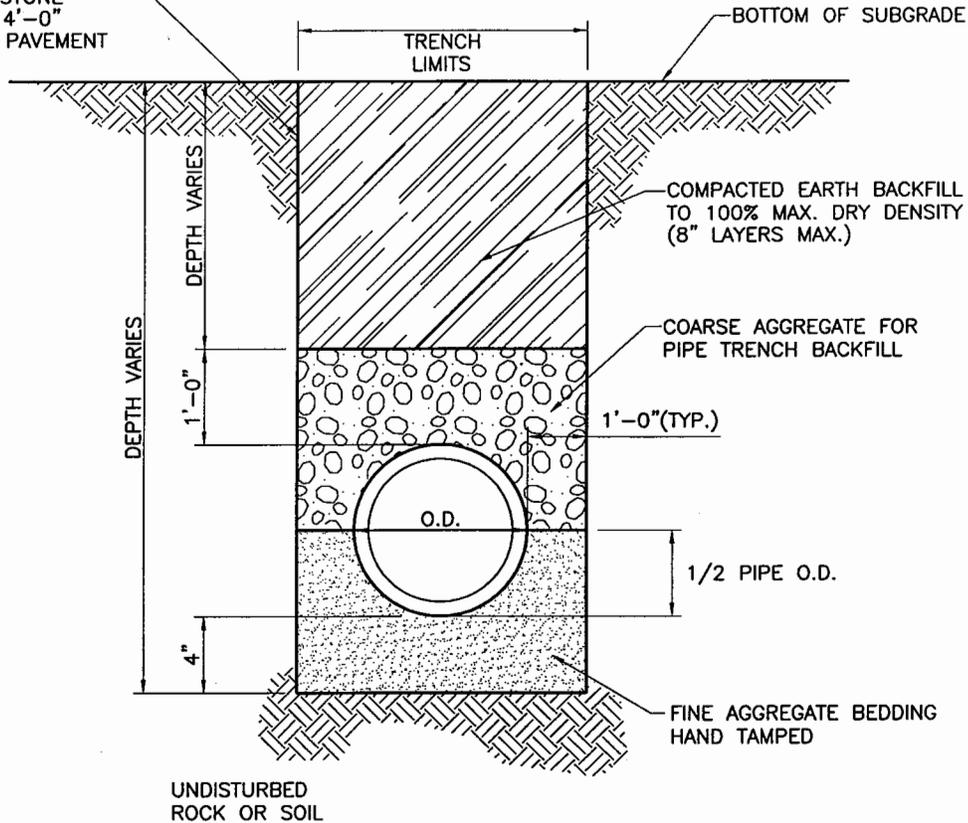
Phone: (724) 846-5337 Fax: (724) 846-6481

**Outlet Structure  
Detail**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SD-08</b>
				Date: 02/03/05

Drawing No. 8.8.

100% 2-A LIMESTONE  
WHEN LOCATED 4'-0"  
FROM EDGE OF PAVEMENT



NOT TO SCALE

NOTES:

1. MATERIAL OBTAINED IN TRENCH EXCAVATION SHALL NOT BE UTILIZED FOR BACKFILL. THIS REQUIREMENT SHALL APPLY TO BACKFILL IN SHOULDER AREAS AS WELL AS BACKFILL WITHIN THE CARTWAY.
2. AGGREGATE MATERIAL SHALL BE PLACED IN LAYERS NOT TO EXCEED EIGHT INCHES AND COMPACTED TO THE FOLLOWING MINIMUM REQUIREMENTS. SHOULDER AREAS AS WELL AS BACKFILL WITHIN THE CARTWAY.

MAXIMUM DRY WEIGHT OF  
BACKFILL MATERIAL (AS  
DETERMINED IN ACCORDANCE  
WITH AASHTO T99)

LESS THE 95.0 LB./CU.FT.  
95.0-99.9 LB./CU. FT.  
100.0-109.9 LB./CU. FT.  
110.0 OR MORE

MAXIMUM FIELD COMPACTION  
REQUIREMENT (PERCENT OF  
MAXIMUM DRY WEIGHT)

UNSUITABLE MATERIAL  
100.  
100.  
95%

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Typical Storm Sewer  
Trench Detail - Within R.O.W.**

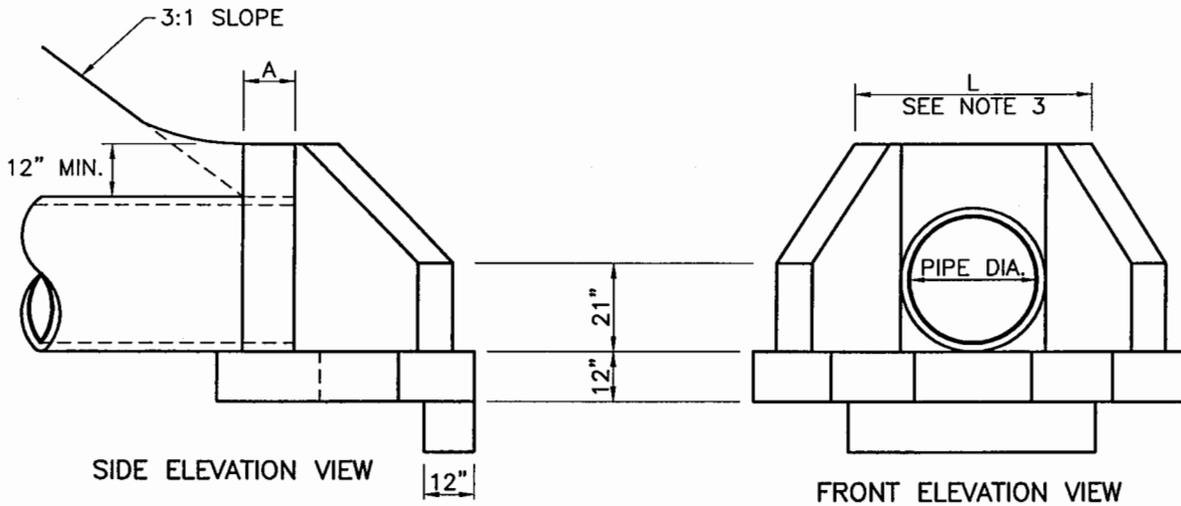
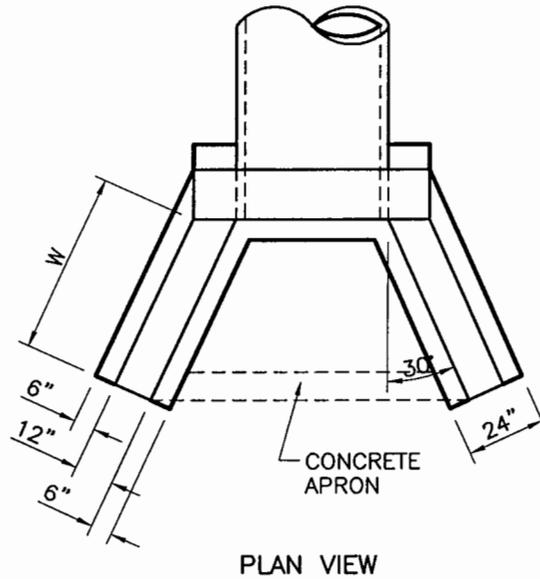
REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-01</b>  Date: 02/03/05

Drawing No. 8.10a

NOTES:

1. CONCRETE SHALL BE CLASS 'A'.
2. EXPOSED EDGES SHALL BE CHAMFERED ONE (1) INCH.
3. ADD 1'-0" TO DIMENSION 'L' WHEN ORIFICE PLATE IS TO BE PLACED ON HEADWALL.

PIPE DIA.	L*	W	A
15"	4.0'	4.0'	12"
18"	4.0'	4.0'	12"
24"	4.5'	4.25'	12"
36"	4.5'	4.25'	12"
48"	5.0'	4.25'	12"



REFERENCE RC-34 - PENNDOT PUBLICATION 72

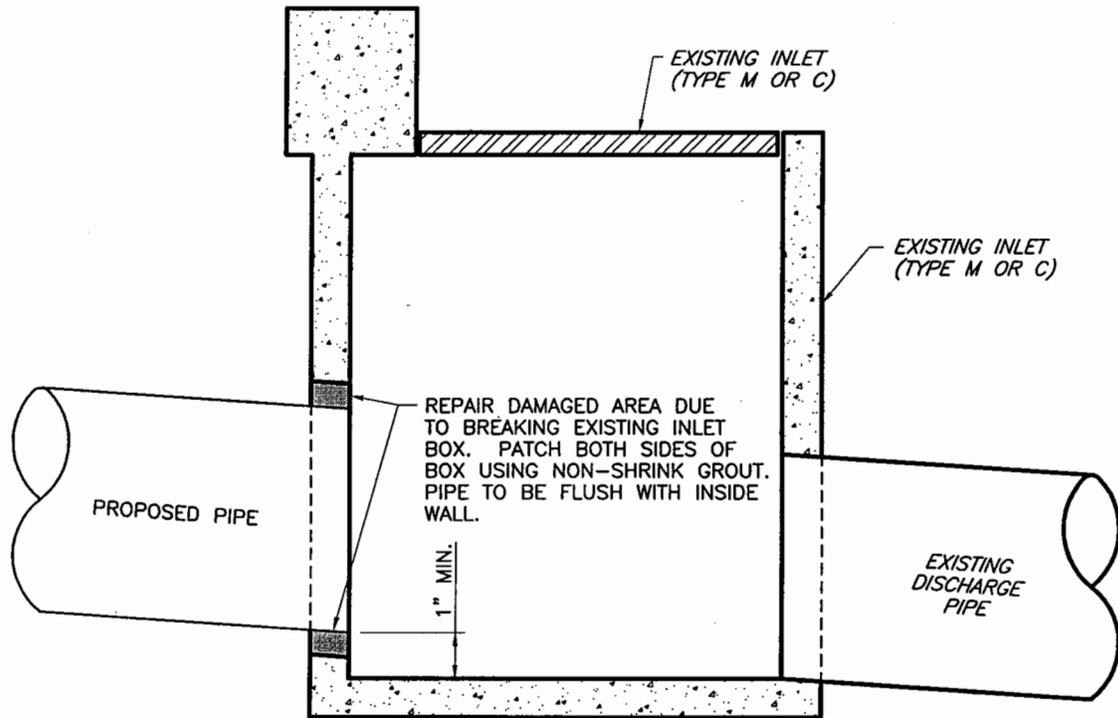
**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Standard Type D-W  
Endwall/Headwall Detail**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-02</b> Date: 02/03/05



**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

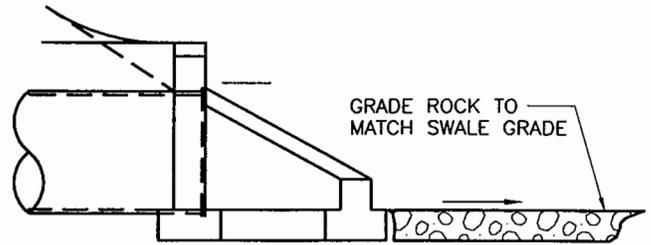
Phone: (724) 846-5337 Fax: (724) 846-6481

**Inlet Connections Detail**

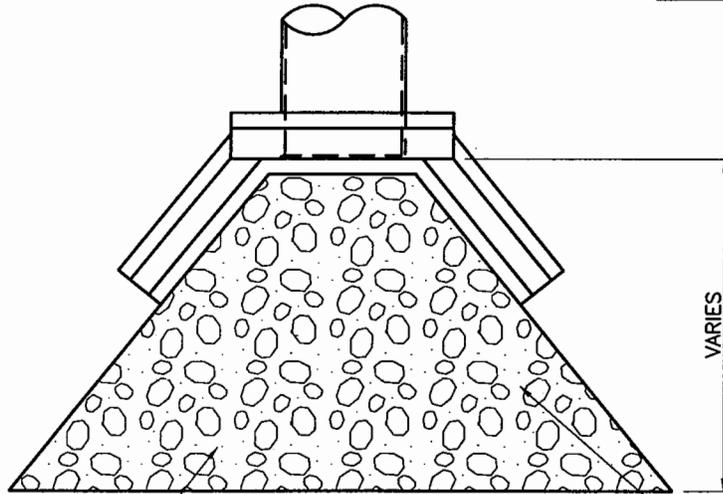
REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-03</b>

Date: 02/03/05

Drawing No. 8.10b



PROFILE

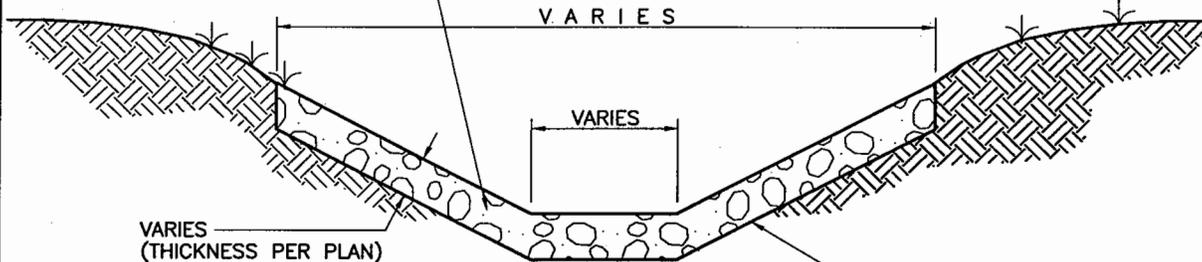


PLAN

SIZE & DEPTH OF ROCK SHALL BE IN ACCORDANCE WITH APPROVED PLANS.

**NOTE:**

USE THIS CONFIGURATION FOR ALL RIP-RAP PLACEMENT @ ENDWALLS UNLESS OTHERWISE APPROVED  
EXAMPLE: R-4 (D50 STONE)  
10'L x 12"W x 12" THICK.



SECTION

CLASS 2 GEOTEXTILE MATERIAL\* SHALL BE INSTALLED ALONG ALL INTERFACE AREAS WITH GROUND CONTACT

\*OR APPROVED EQUAL

NOT TO SCALE.

**DAUGHERTY TOWNSHIP**

Beaver County, PA

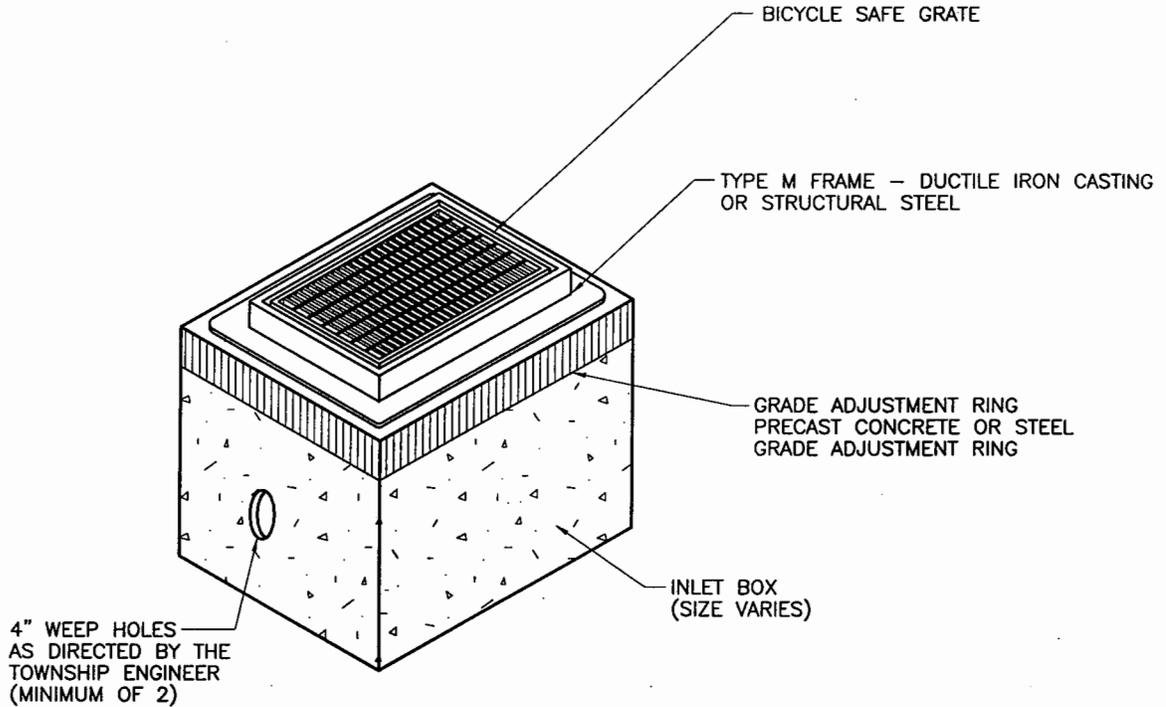
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Rip-Rap Detail  
Storm Sewer Outfall**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SS-04</b>
				Date: 02/03/05

Drawing No. 8.2.2.



**NOTES:**

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH PENNDOT PUBLICATION 408, SECTION 605 AND STANDARDS FOR ROADWAY CONSTRUCTION, RC-34. CONTRACTOR SHALL VERIFY INLET BOX SIZING BASED ON PIPE SIZES AND ALIGNMENT PRIOR TO ORDERING PRECAST STRUCTURES.
2. ALL DRAINAGE STRUCTURES SHALL HAVE POURED-IN-PLACE CONCRETE CHANNEL BOTTOMS.
3. ALL INLETS OVER 5' IN DEPTH SHALL HAVE STEPS INSTALLED.

NOT TO SCALE

REFERENCE RC-34 - PENNDOT PUBLICATION 72

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

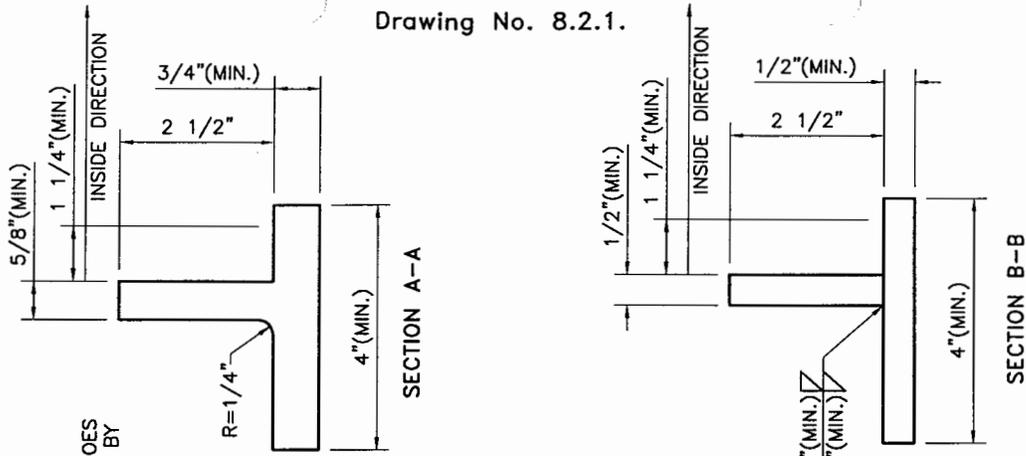
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Type "M"  
Inlet Detail**

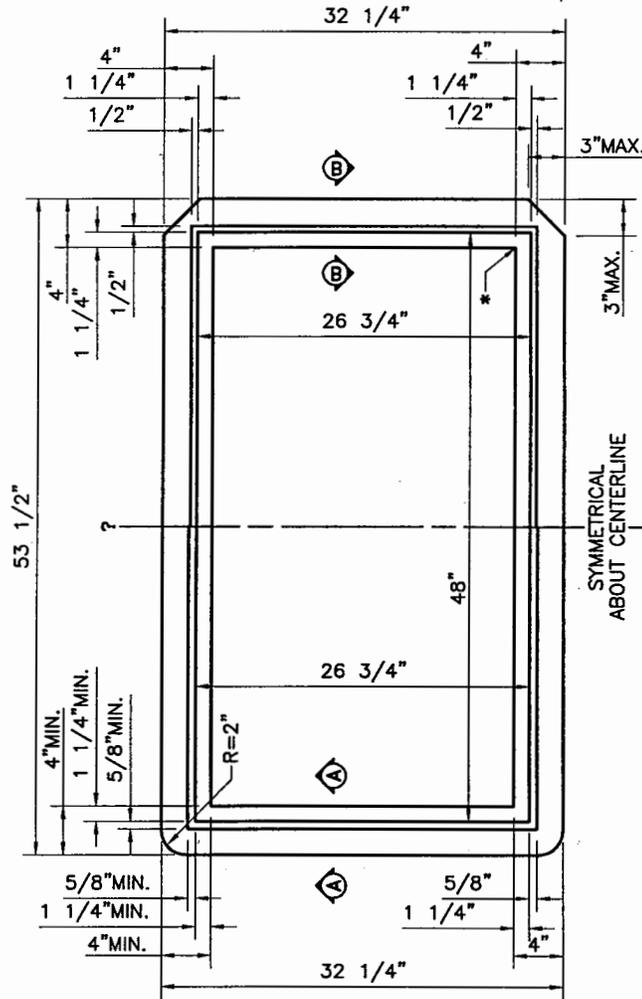
REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-05</b> Date: 02/03/05

Drawing No. 8.2.1.



**NOTES:**

1. THIS DETAIL DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. ONLY FRAMES SUPPLIED BY MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED.
2. PROVIDE EITHER GRAY, MALLEABLE OR DUCTILE IRON CASTINGS OR STRUCTURAL STEEL FRAMES.
3. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(R).



\* CORNER CONFIGURATION DETAILS ARE FABRICATOR'S RESPONSIBILITY AND SHALL BE APPROVED.

STRUCTURAL STEEL FABRICATION  
FERROUS CAST MATERIAL FABRICATION

NOT TO SCALE

REFERENCE RC-34 - PENNDOT PUBLICATION 72

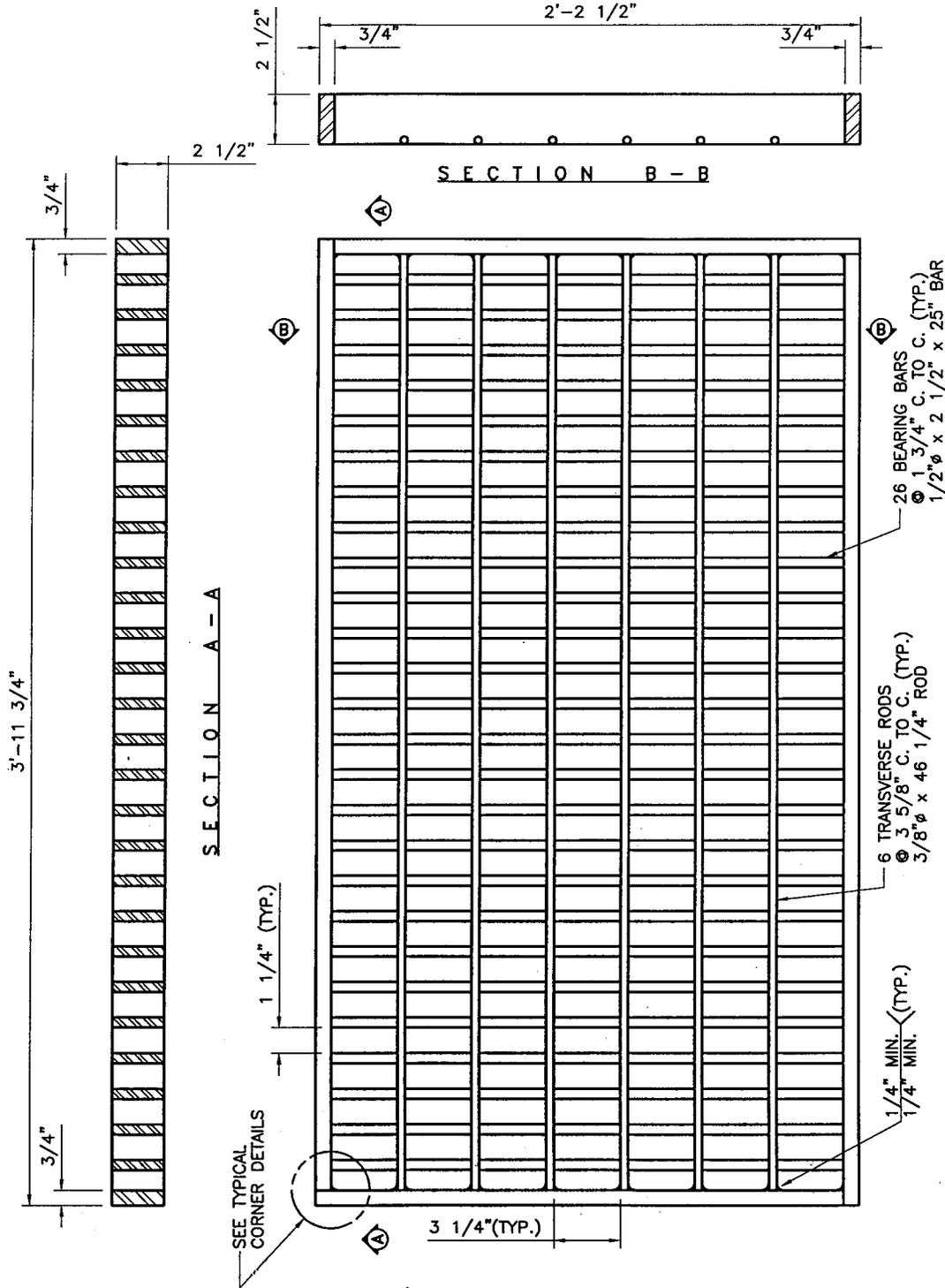
**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639  
Phone: (724) 846-5337 Fax: (724) 846-6481

**Type "M"  
Inlet Frame Detail**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SS-05A</b>
				Date: 02/03/05

Drawing No. 8.2.1.



REFERENCE RC-34 - PENNDOT PUBLICATION 72

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

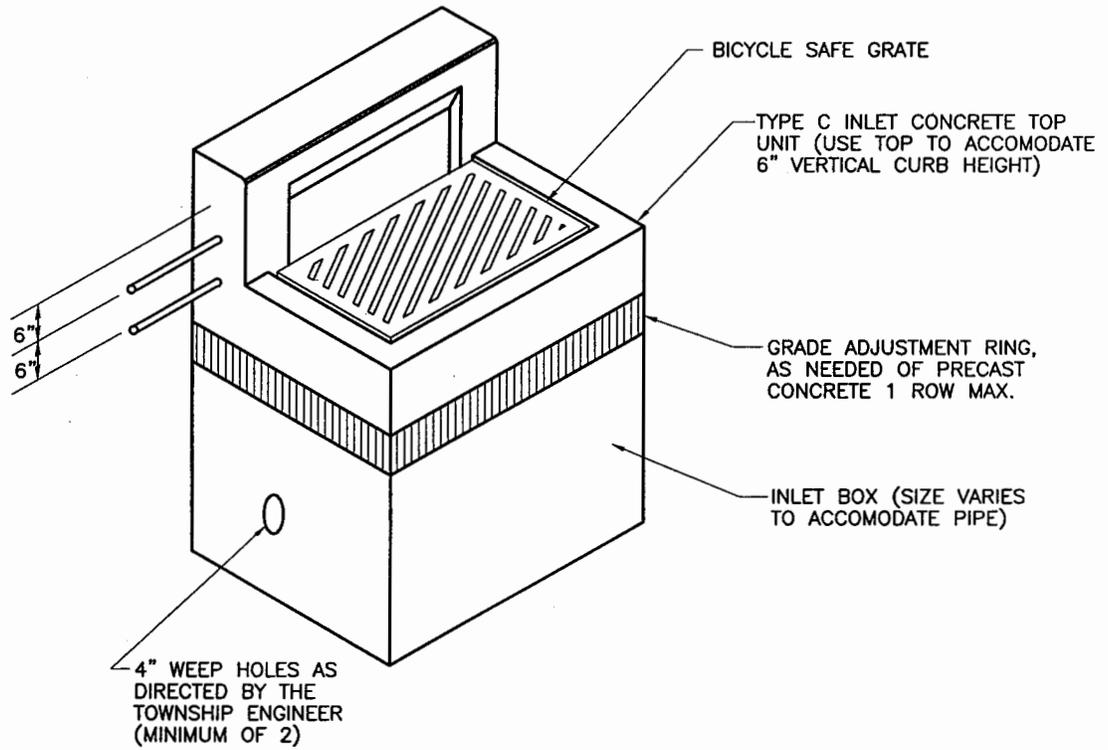
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Structural Steel  
Bicycle Safe Grate**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SS-05B</b>
				Date: 02/03/05

Drawing No. 8.2.2a.



NOT TO SCALE

**NOTES**

- 1. ALL INLETS OVER 5' IN DEPTH SHALL HAVE STEPS INSTALLED.

REFERENCE RC-34 - PFNNDOT PUBLICATION 72

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

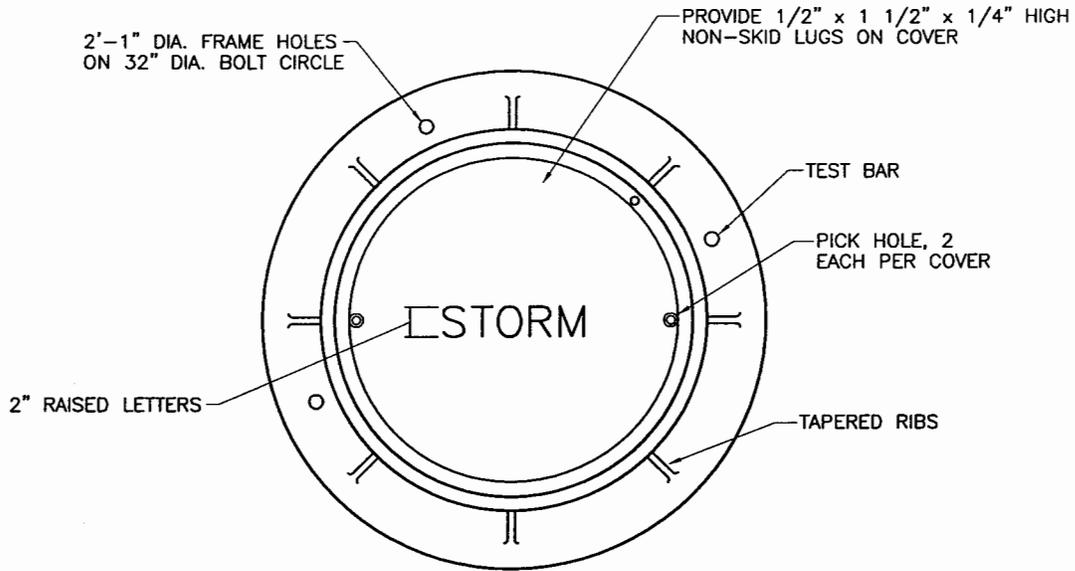
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

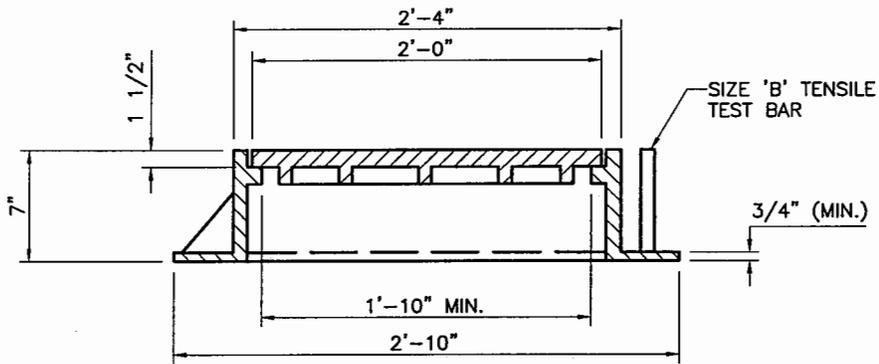
**Type "C"  
Inlet Detail**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-06</b>  Date: 02/03/05

Drawing No. 8.3.1.



PLAN



SECTION

NOT TO SCALE

REFERENCE RC-39 - PENNDOT PUBLICATION 72

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

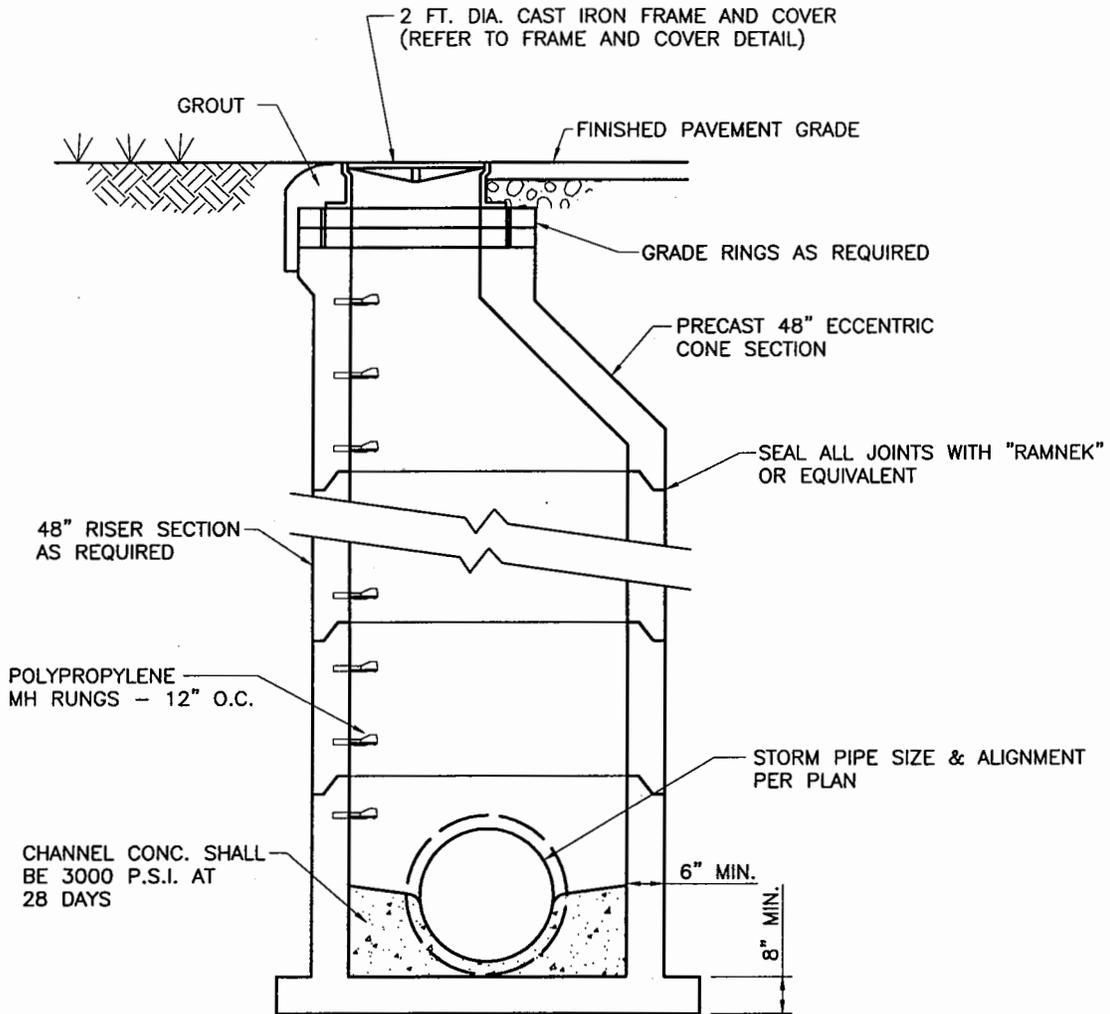
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

## Standard Manhole Frame and Cover

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-07</b> Date: 02/03/05

Drawing No. 8.3.



NOT TO SCALE

REFERENCE RC-39 - PENNDOT PUBLICATION 72

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

## Storm Manhole Detail (Typical Section)

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SS-08</b>
				Date: 02/03/05

Drawing No. 8.3.3.

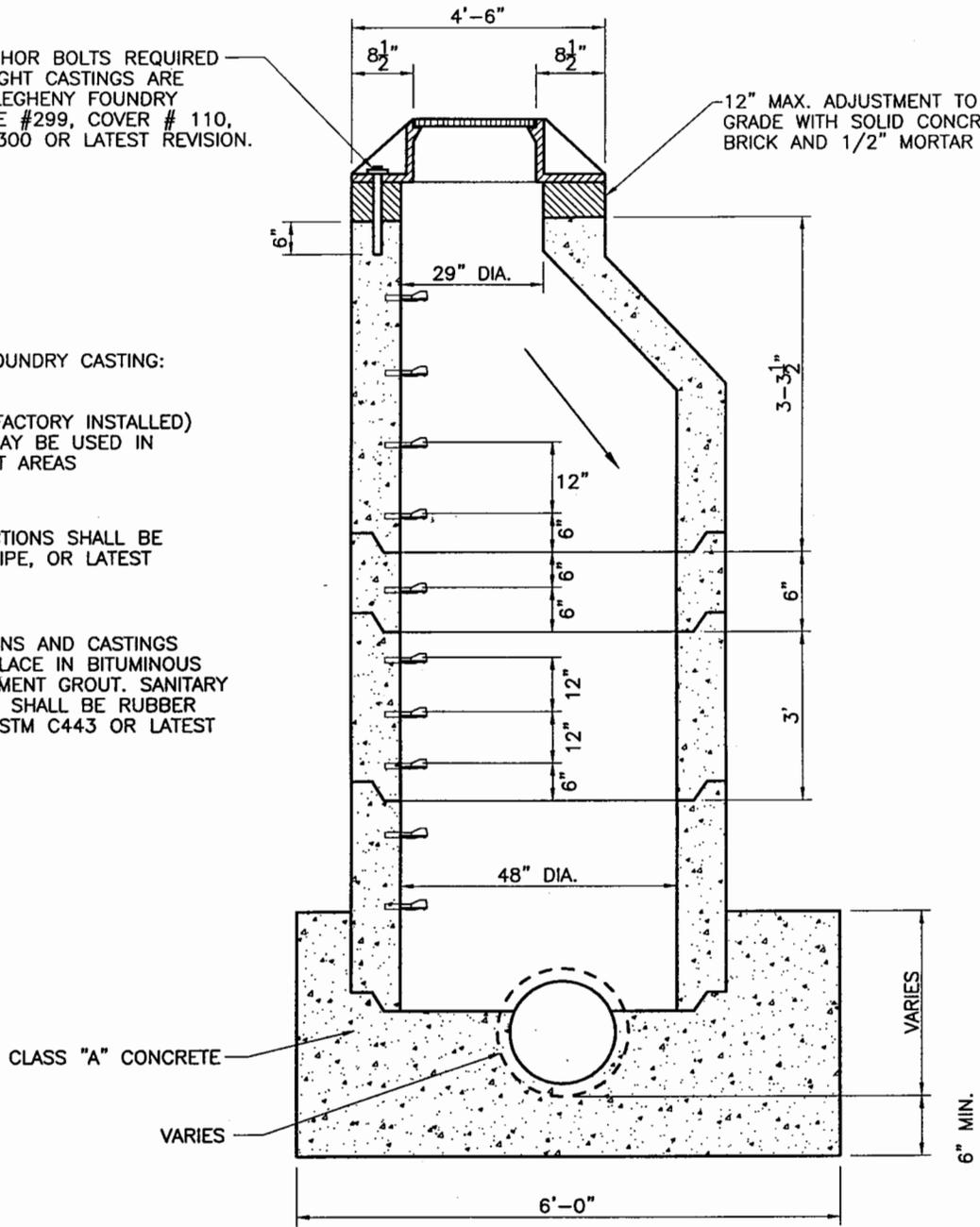
3/4" DIA. ANCHOR BOLTS REQUIRED WHEN WATERTIGHT CASTINGS ARE SPECIFIED. ALLEGHENY FOUNDRY CASTING FRAME #299, COVER # 110, SEAL PLATE #300 OR LATEST REVISION.

12" MAX. ADJUSTMENT TO GRADE WITH SOLID CONCRETE BRICK AND 1/2" MORTAR

ALLEGHENY FOUNDRY CASTING:  
 FRAME #26  
 COVER #25  
 STEPS #64 (FACTORY INSTALLED)  
 FRAME #65 MAY BE USED IN OFF PAVEMENT AREAS

MANHOLE SECTIONS SHALL BE ASTM C478 PIPE, OR LATEST REVISION

MANHOLE SECTIONS AND CASTINGS TO BE SET IN PLACE IN BITUMINOUS MATERIAL OR CEMENT GROUT. SANITARY MANHOLE JOINTS SHALL BE RUBBER TYPE GASKETS ASTM C443 OR LATEST REVISION.



NOT TO SCALE

**DAUGHERTY TOWNSHIP**  
 Beaver County, PA

2182 Mercer Road  
 New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Pre-Cast Concrete Manhole  
 Pipes Under 48"**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SS-09</b>
				Date: 02/03/05

Drawing No. 8.3.2.

3/4" DIA. ANCHOR BOLTS REQUIRED WHEN WATERTIGHT CASTINGS ARE SPECIFIED. ALLEGHENY FOUNDRY CASTING FRAME #299, COVER # 110, SEAL PLATE #300 OR LATEST REVISION.

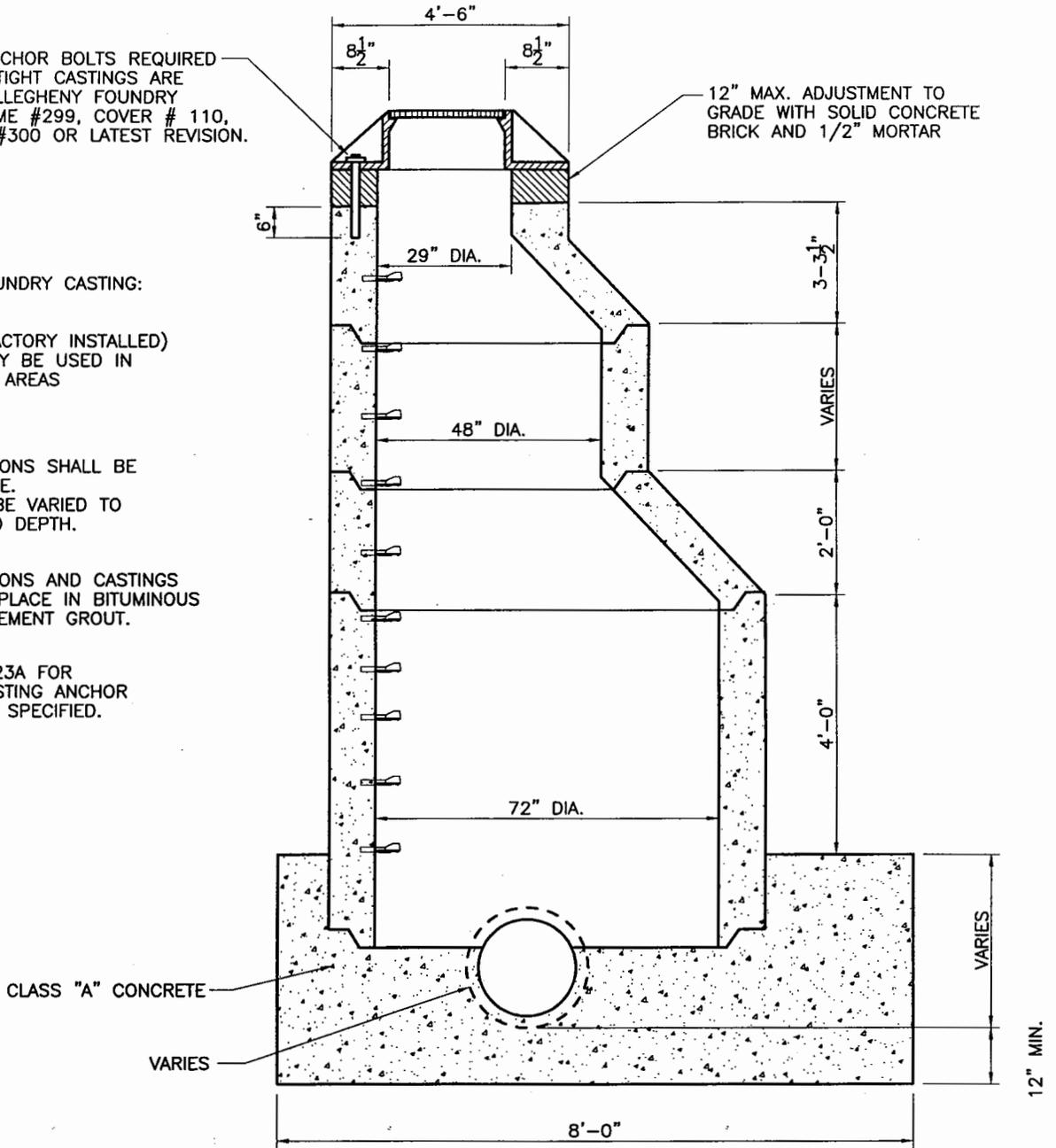
12" MAX. ADJUSTMENT TO GRADE WITH SOLID CONCRETE BRICK AND 1/2" MORTAR

ALLEGHENY FOUNDRY CASTING:  
 FRAME #26  
 COVER #25  
 STEPS #64 (FACTORY INSTALLED)  
 FRAME #65 MAY BE USED IN OFF PAVEMENT AREAS

MANHOLE SECTIONS SHALL BE ASTM C478 PIPE. LENGTHS MAY BE VARIED TO OBTAIN DESIRED DEPTH.

MANHOLE SECTIONS AND CASTINGS TO BE SET IN PLACE IN BITUMINOUS MATERIAL OR CEMENT GROUT.

SEE FIGURE 4.23A FOR WATERTIGHT CASTING ANCHOR DETAILS WHERE SPECIFIED.



NOT TO SCALE

**DAUGHERTY TOWNSHIP**  
 Beaver County, PA

2182 Mercer Road  
 New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Pre-Cast Concrete Manhole  
 Pipes Over 48" Dia.**

REVISIONS			
NO.	DATE	NO.	DATE

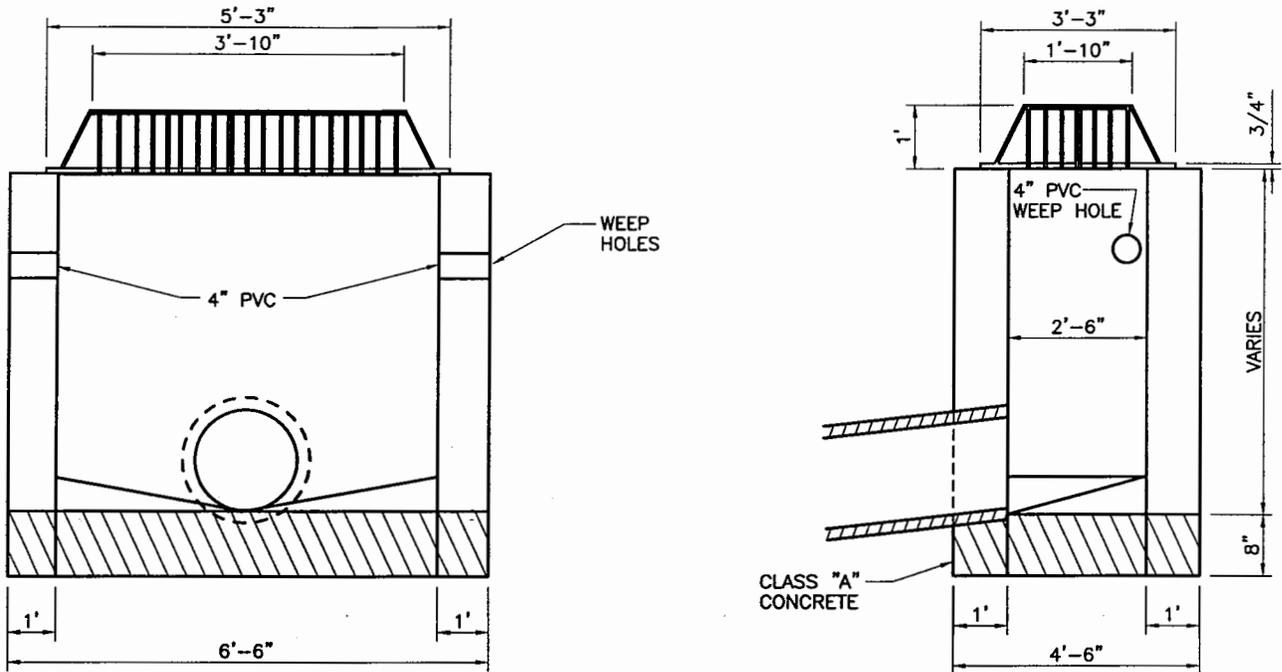
DRAWING

**SS-10**

Date: 02/03/05

Drawing No. 8.4.1.

CASTING: FOUNDRY FRAME NO. 69, GRATING NO. 68 OR EQUAL



NOT TO SCALE

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

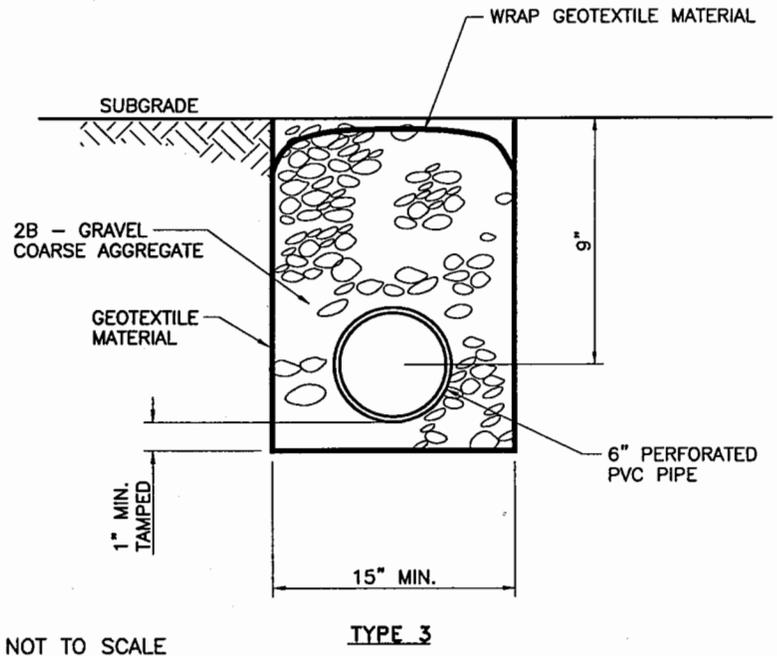
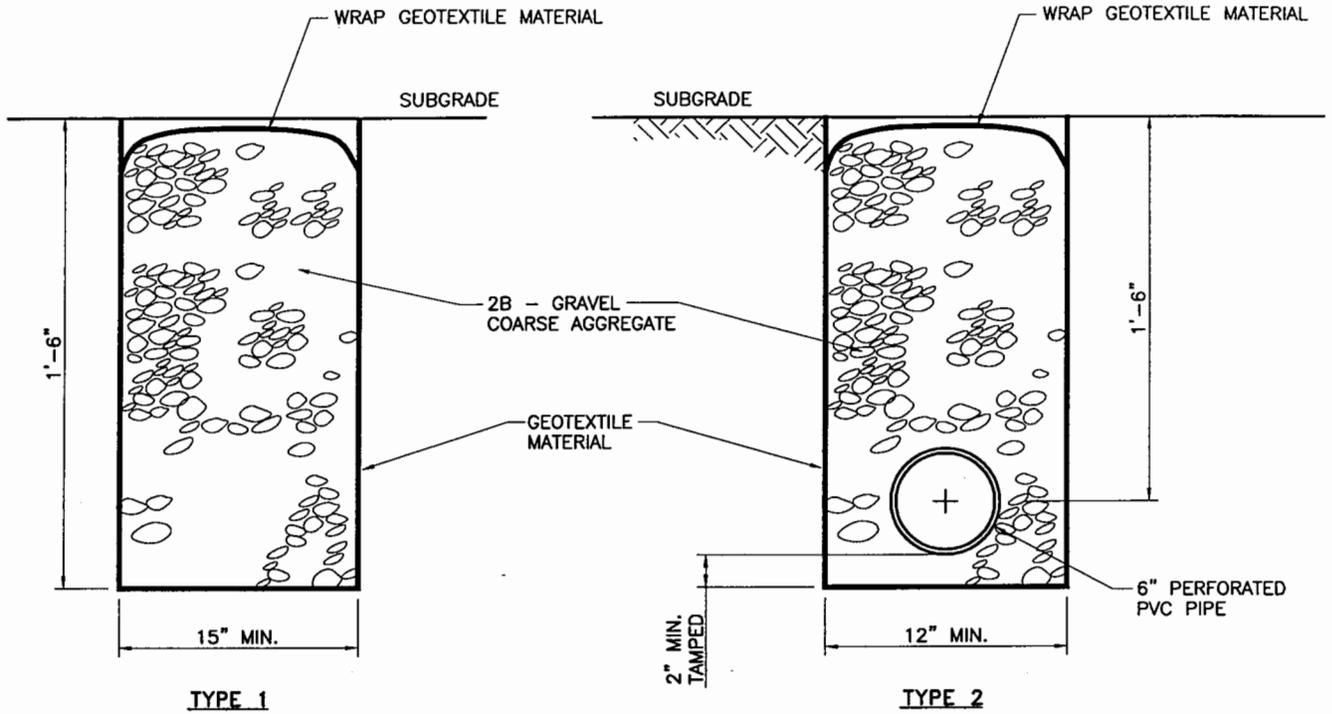
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

## Yard Drains

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-11</b> Date: 02/03/05

Drawing No. 8.4.2.



NOT TO SCALE

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

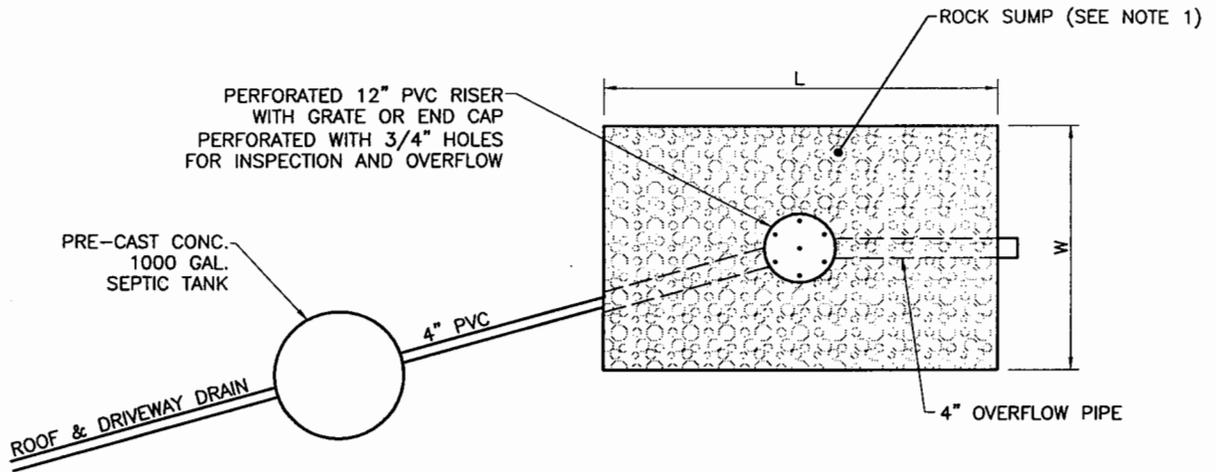
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

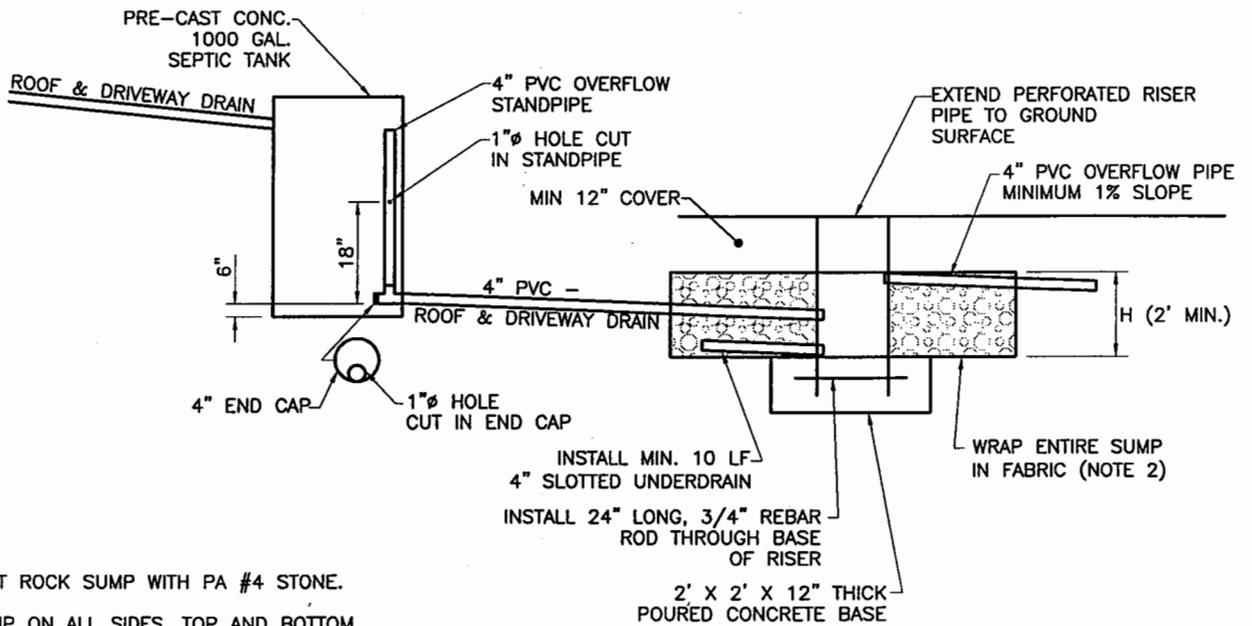
## Special Underdrain

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-12</b>  Date: 02/03/05

Drawing No. 8.7.6.2.



**PLAN**



**SECTION**

NOT TO SCALE

**NOTES:**

1. CONSTRUCT ROCK SUMP WITH PA #4 STONE.
2. WRAP SUMP ON ALL SIDES, TOP AND BOTTOM WITH GEOTEXTILE MATERIAL
3. SEE SIZING CHART SS-13A FOR SUMP STORAGE VOLUME.

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

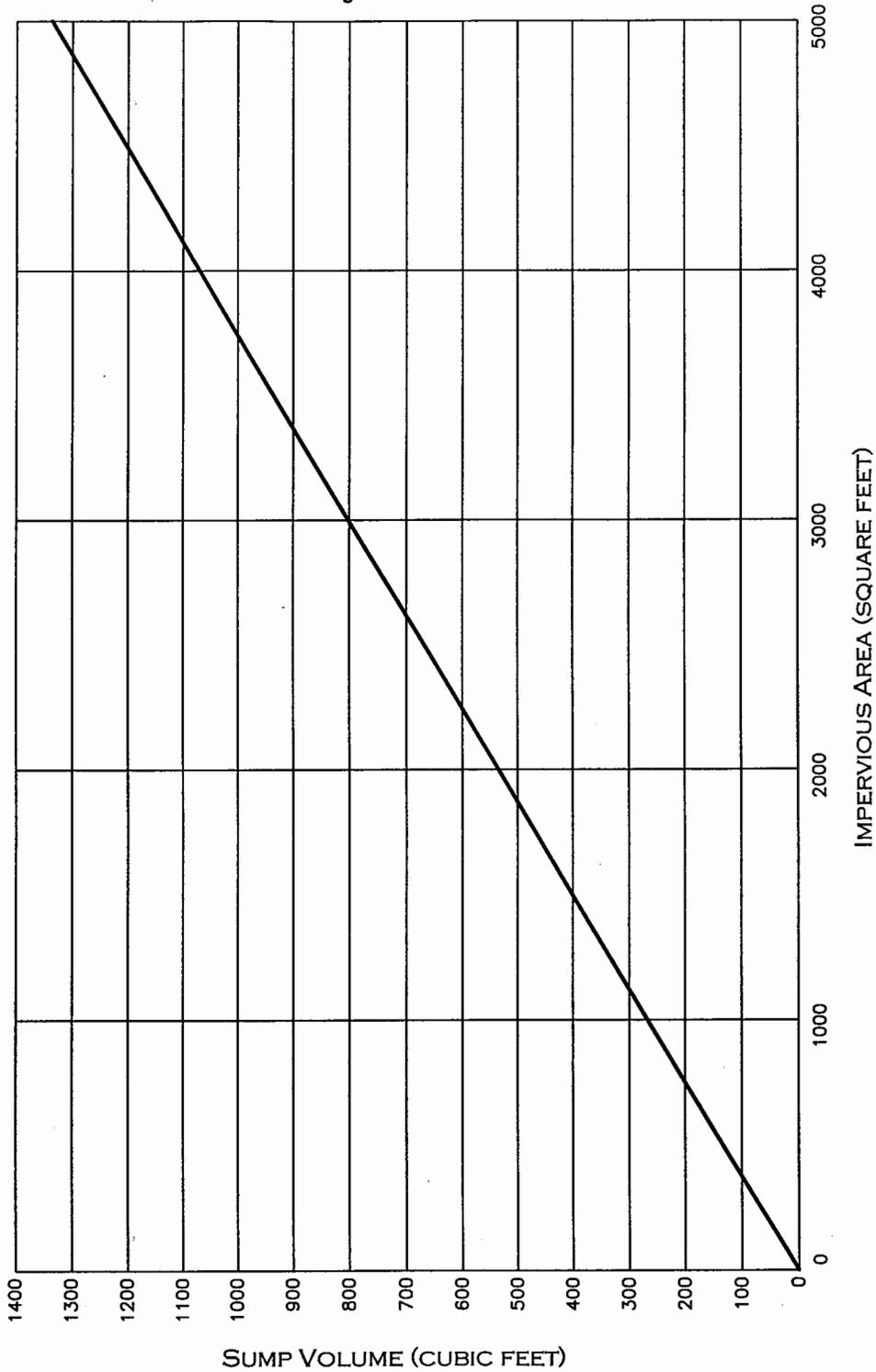
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846 5337 Fax: (724) 846 6481

**Stormwater  
Containment System**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SS-13</b>
				Date: 02/03/05

Drawing No. 7.7.6.2.



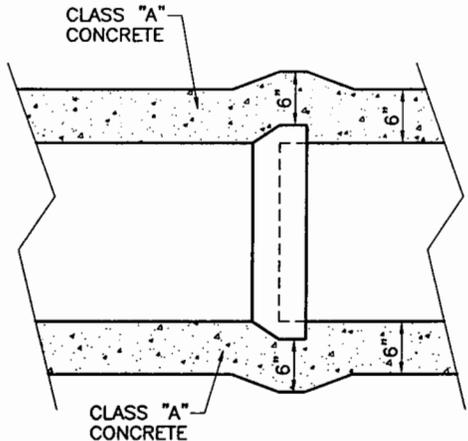
**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

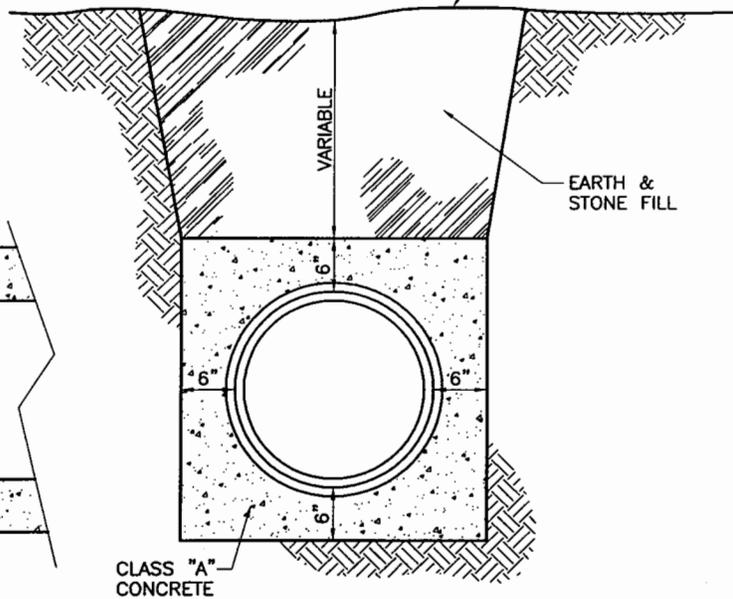
Phone: (724) 846-5337 Fax: (724) 846-6481

## Rock Sump Sizing Chart

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-13A</b> Date: 02/03/05

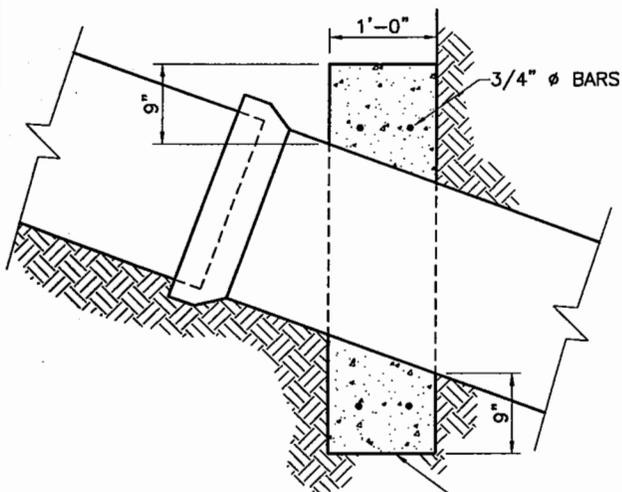


PLAN OR ELEVATION

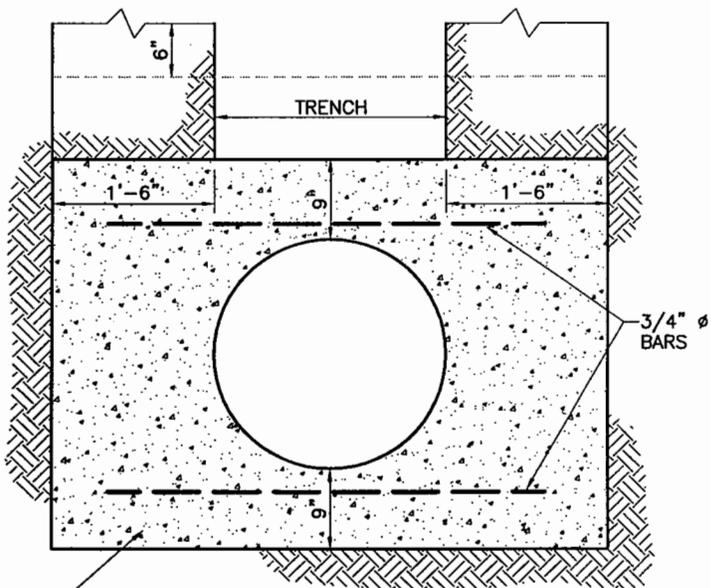


SECTION

EXTEND ANCHOR TO 6" BELOW GROUND WHEN DIRECTED ON STEEP GRADES TO PREVENT TRENCH EROSION.



SECTION



ELEVATION

PROVIDE NO ANCHORS ON GRADES LESS THAN 20%.  
 PROVIDE ANCHORS 36' C.C. ON GRADES BETWEEN 20% AND 34%.  
 PROVIDE ANCHORS 24' C.C. ON GRADES BETWEEN 34% AND 50%.  
 PROVIDE ANCHORS 15' C.C. ON GRADES BETWEEN 50% AND 70%.

**DAUGHERTY TOWNSHIP**

Beaver County, PA

2182 Mercer Road  
 New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Concrete Encasement & Anchors for Sewers**

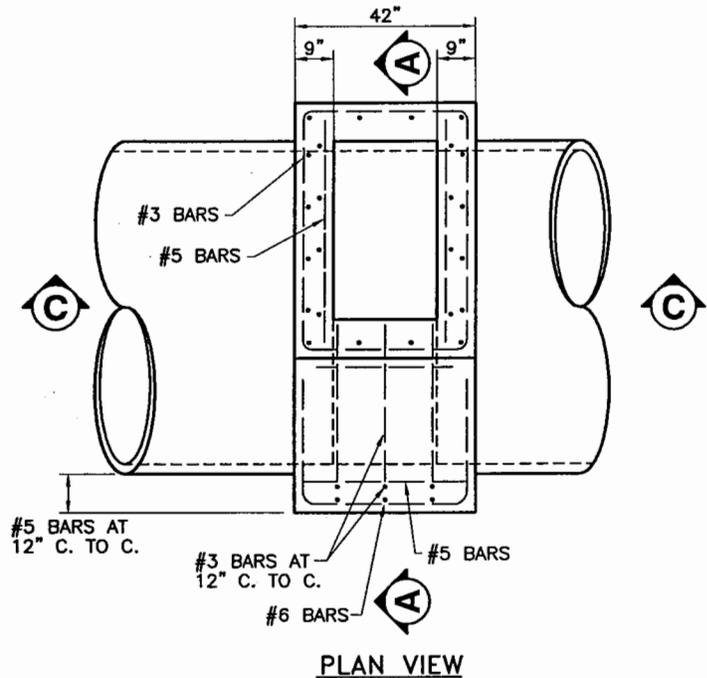
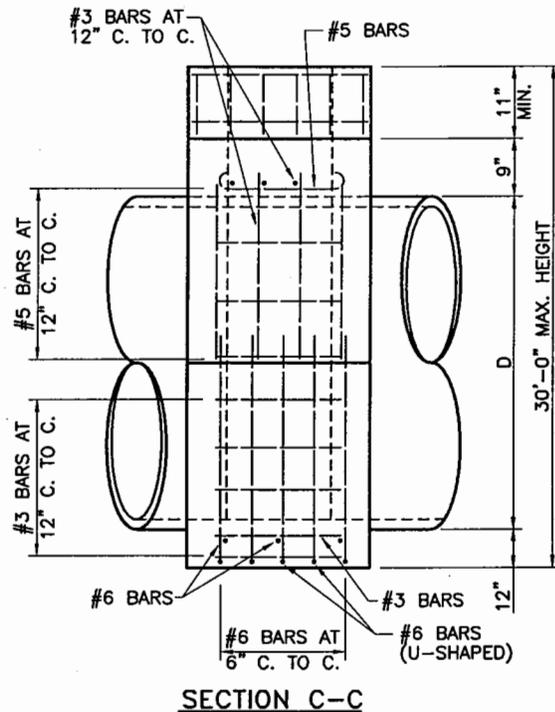
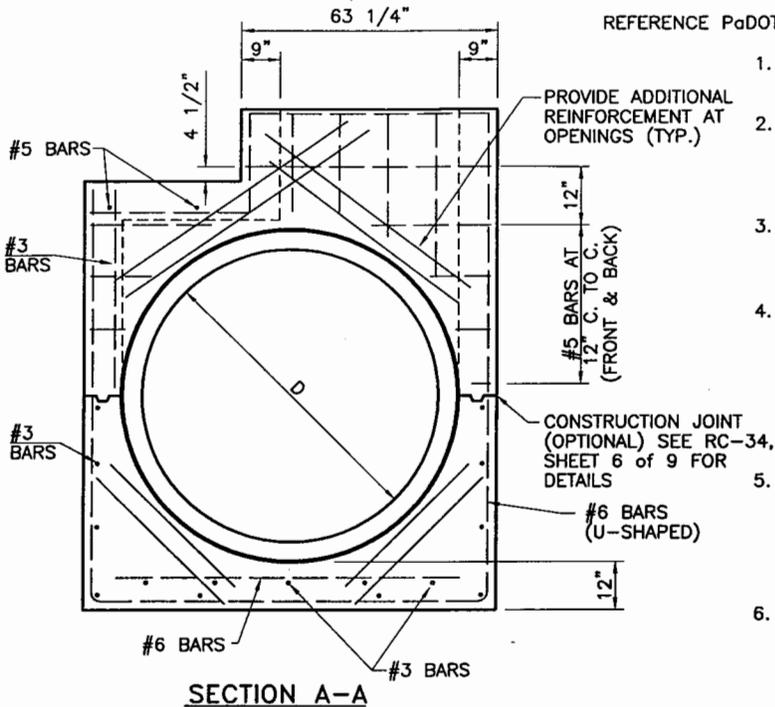
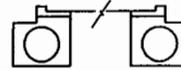
REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SS-14</b>

Date: 02/03/05

REFERENCE PaDOT RC-34.

**NOTES**

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF OF PUBLICATION 408, SECTION 605 AND SECTION 714.
2. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLES. SEE RC-39.
3. WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, SPECIAL DETAILS AND DESIGN SHALL BE PROVIDED.
4. FOR ORIENTATION OF THE TYPE C INLET WITH MODIFIED TYPE I INLET BOX, THE TYPICAL INSTALLATION DETAILS ARE SHOWN BELOW. ANY VARIATION SHALL BE SHOWN ON THE CONSTRUCTION DRAWINGS BY SPECIAL DETAILS.
5. PROVIDE A MINIMUM HEIGHT OF 20 INCHES MEASURED FROM THE TOP SURFACE OF THE TOP UNIT TO THE INSIDE TOP OF THE PIPE WHEN THE TOP UNIT AND EITHER A MODIFIED TYPE I OR A MODIFIED TYPE II INLET BOX ARE CONSTRUCTED MONOLITHICALLY.
6. ONLY PRECAST MODIFIED INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.



**DAUGHERTY TOWNSHIP**  
Beaver County, PA

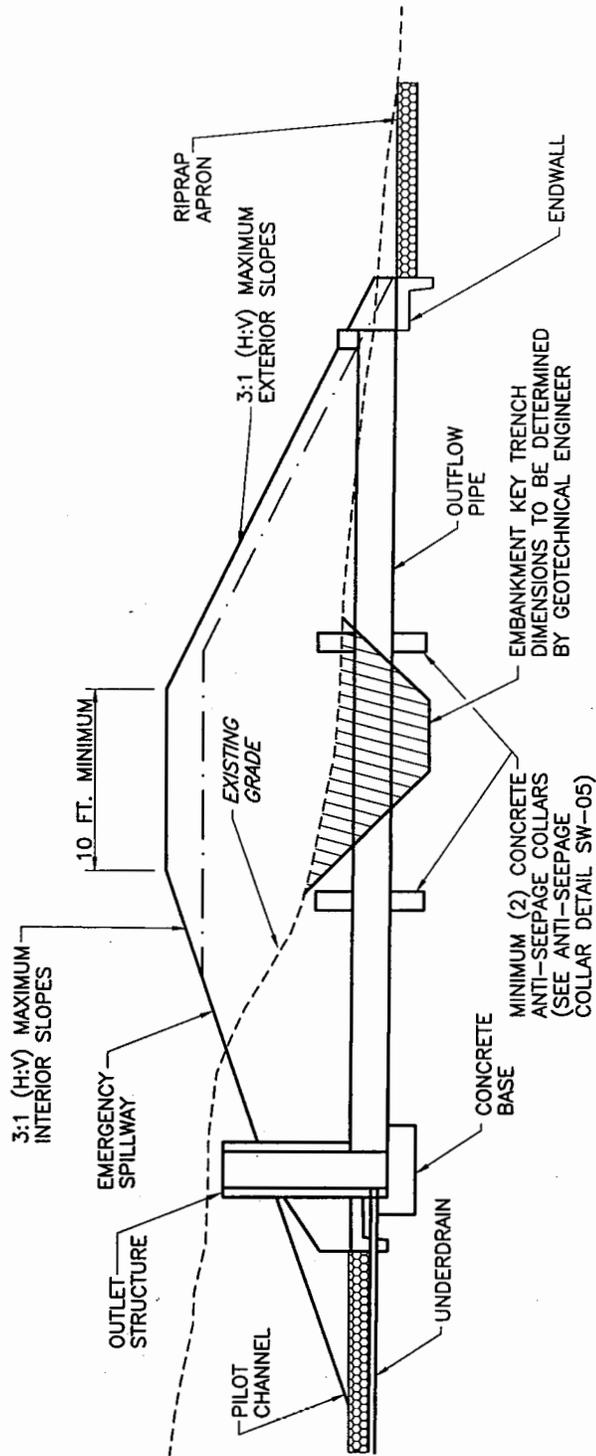
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Inlet Box  
Modified Type - II**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SS-14A</b>

Date: 02/03/05



**DAUGHERTY TOWNSHIP**  
Beaver County, PA

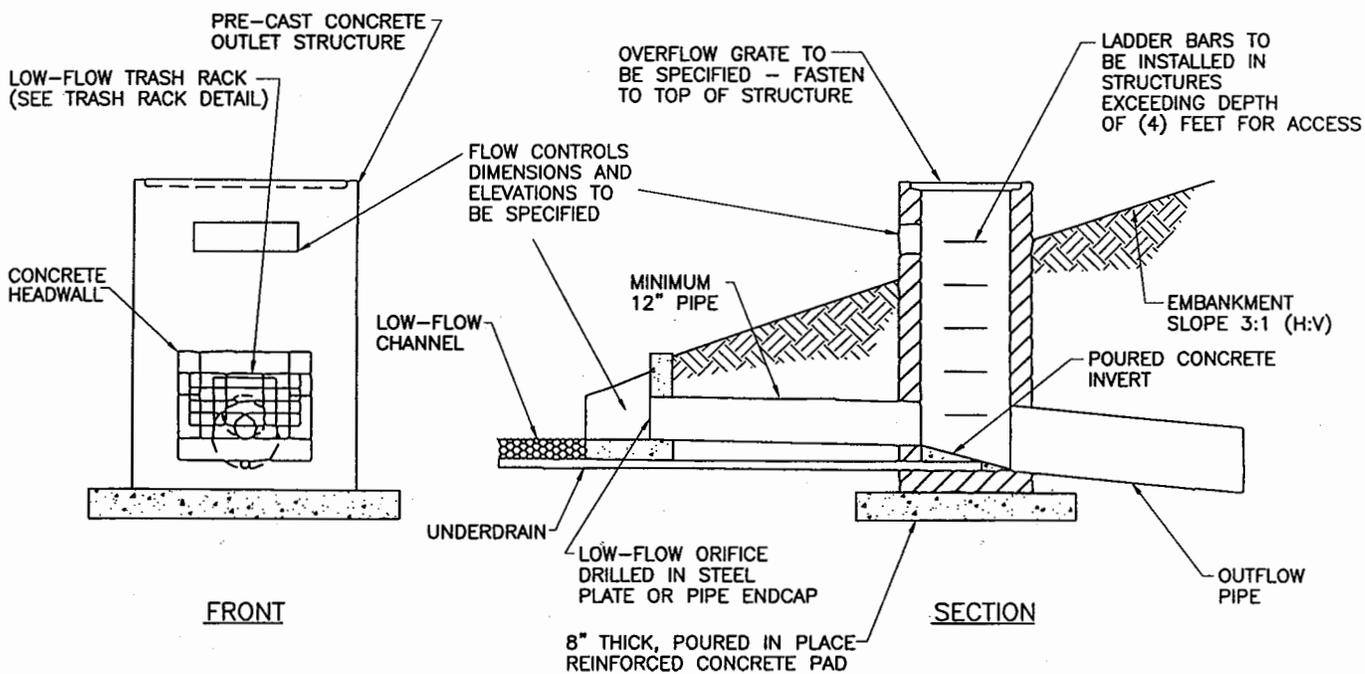
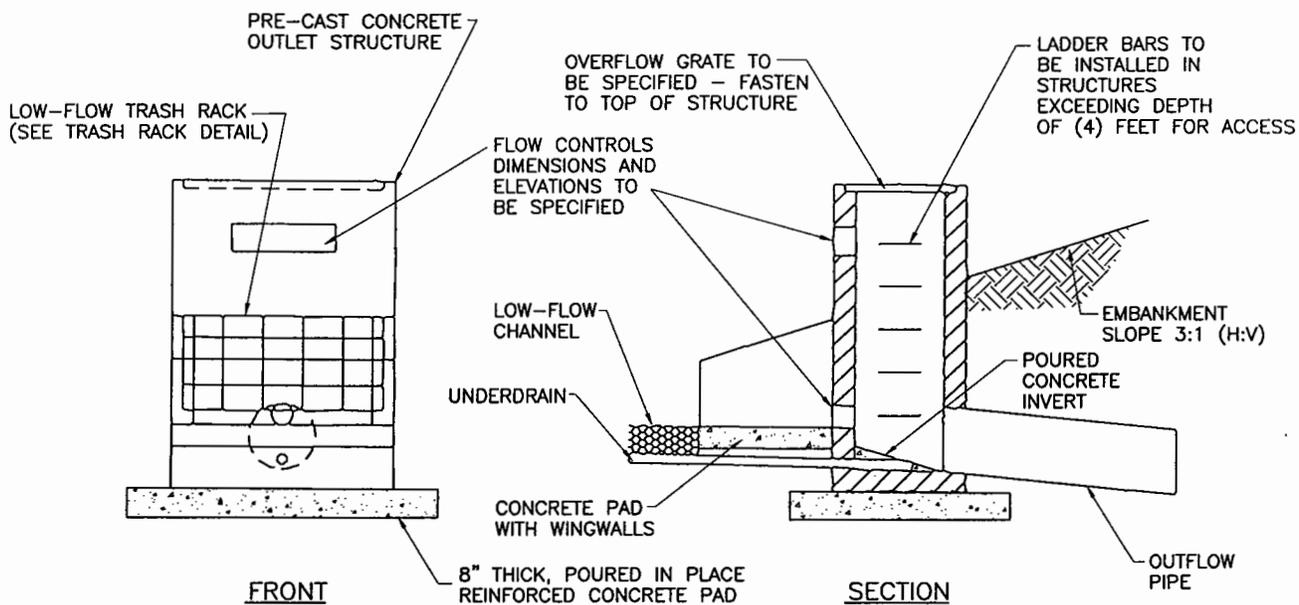
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Detention Facility  
Embankment (Typical)**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SW-01</b>
				Date: 02/03/05

Drawing No. 8.7.4.15a



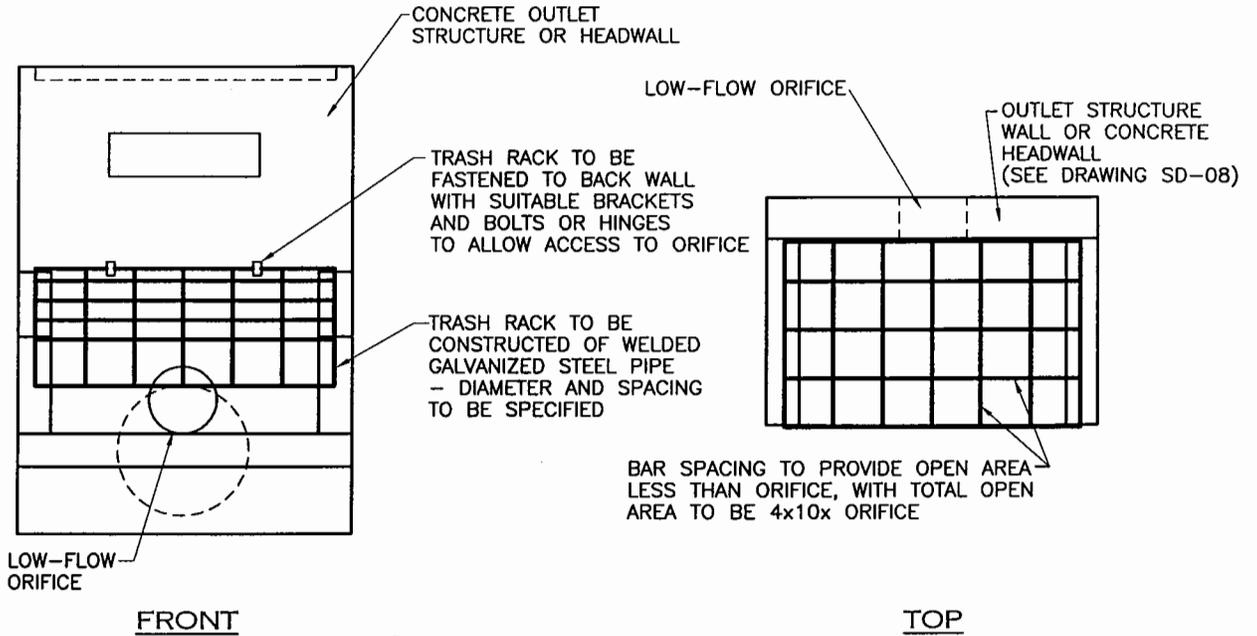
**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

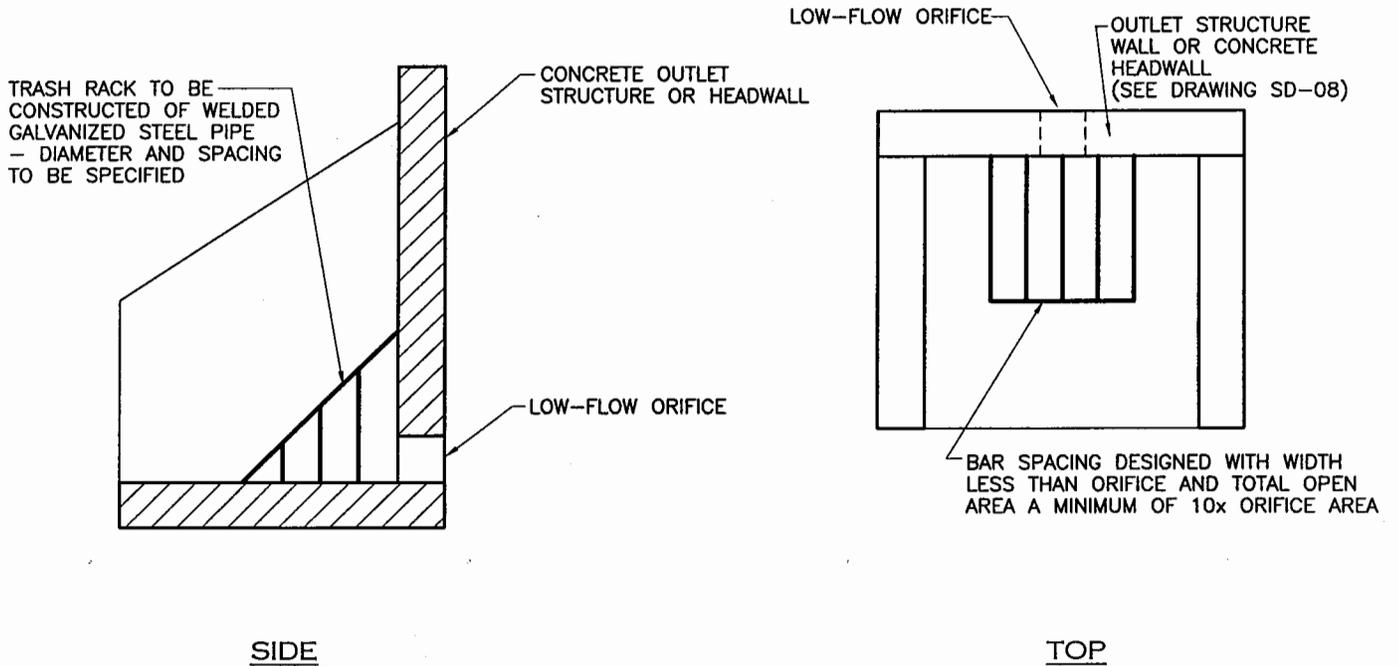
Phone: (724) 846-5337 Fax: (724) 846-6481

## Detention Facility Outlet Structures (Typical)

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	<b>SW-02</b>  Date: 02/03/05



BAR SPACING TO PROVIDE OPEN AREA LESS THAN ORIFICE, WITH TOTAL OPEN AREA TO BE 4x10x ORIFICE



BAR SPACING DESIGNED WITH WIDTH LESS THAN ORIFICE AND TOTAL OPEN AREA A MINIMUM OF 10x ORIFICE AREA

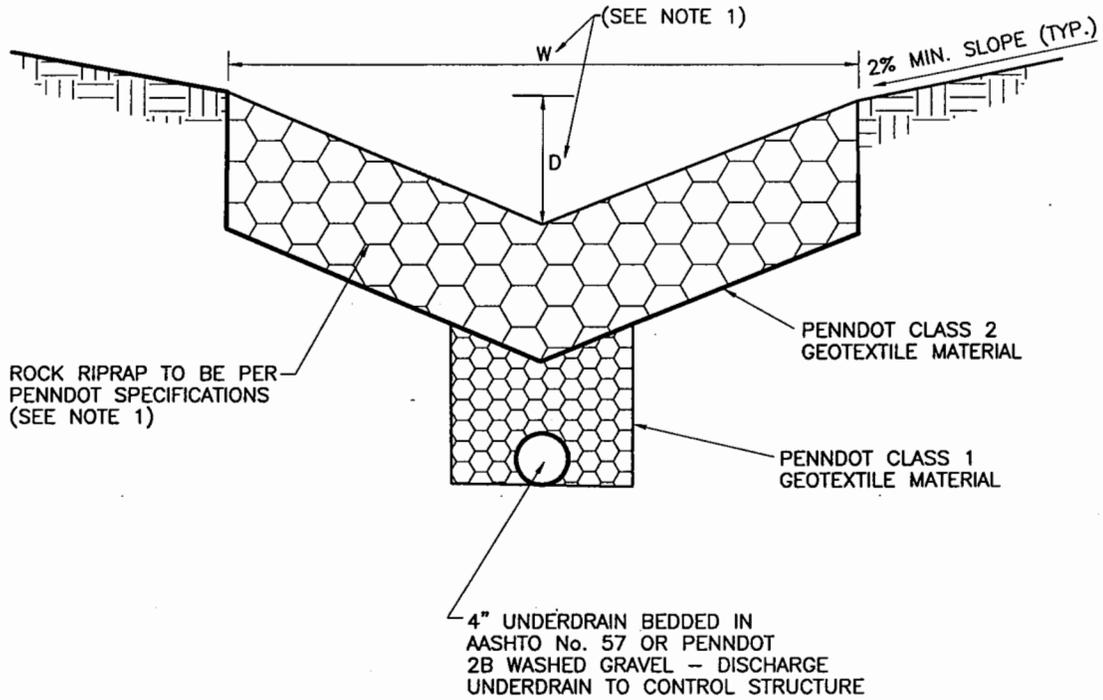
**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

## Detention Facility Low-Flow Trash Racks (Typical)

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SW-03</b>
				Date: 02/03/05



**NOTES:**

1. CHANNEL DIMENSIONS (W,D) AND RIPRAP SIZE AND THICKNESS TO BE DETERMINED BASED ON DESIGN FLOW AND VELOCITY.
2. CHANNEL SHOULD BE DESIGNED TO HAVE A MINIMUM LONGITUDINAL SLOPE OF 1% TOWARD CONTROL STRUCTURE.
3. USE AS DETAIL FOR LOW FLOW CHANNEL DETENTION BASIN.

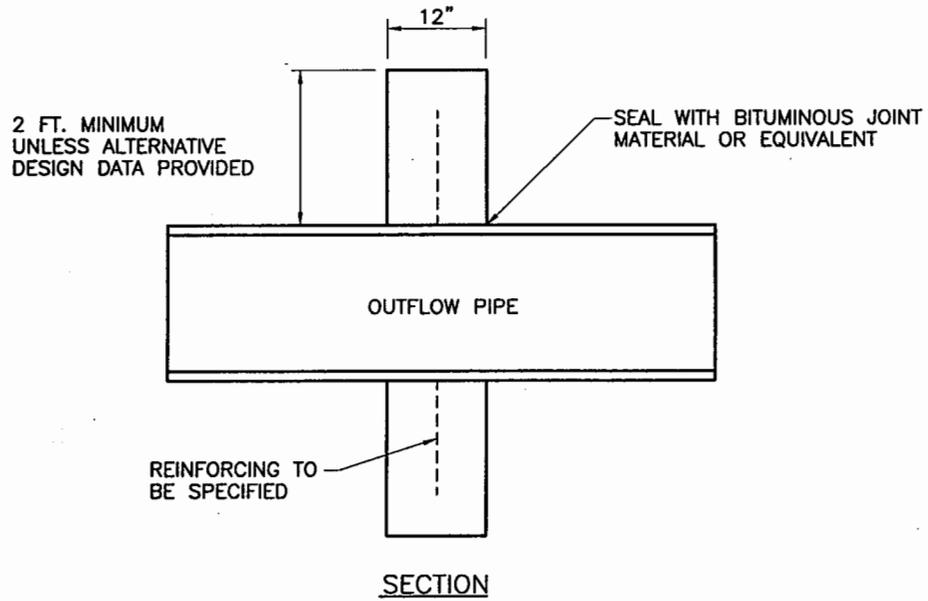
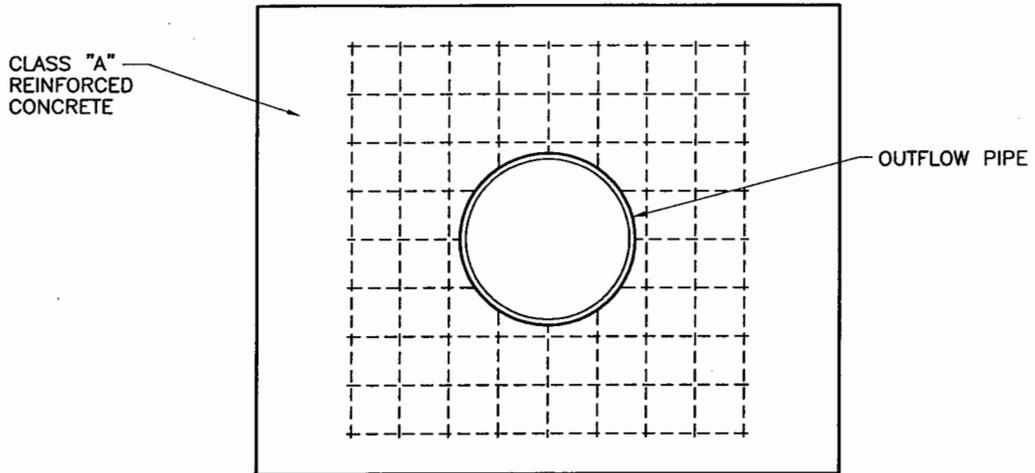
**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Rip-Rap Pilot Channel  
(Typical)**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SW-04</b>
				Date: 02/03/05



**NOTE:**

NUMBER OF ANTI-SEEPAGE COLLARS TO BE INSTALLED AND SPACING TO BE SPECIFIED ON DETENTION FACILITY PROFILE.

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

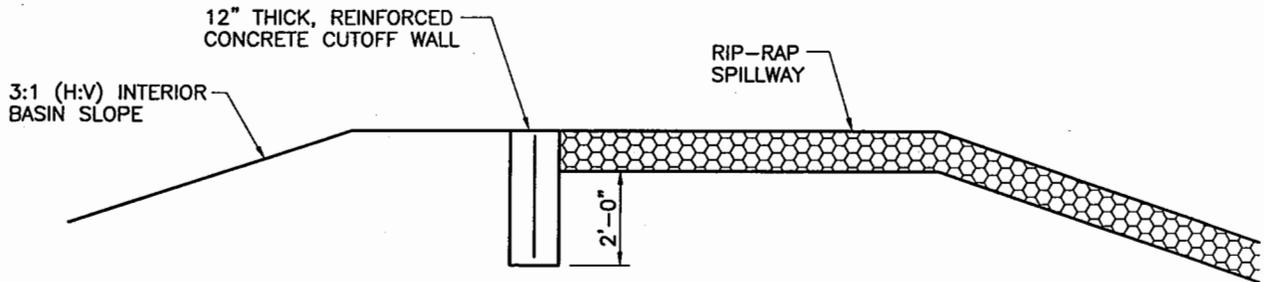
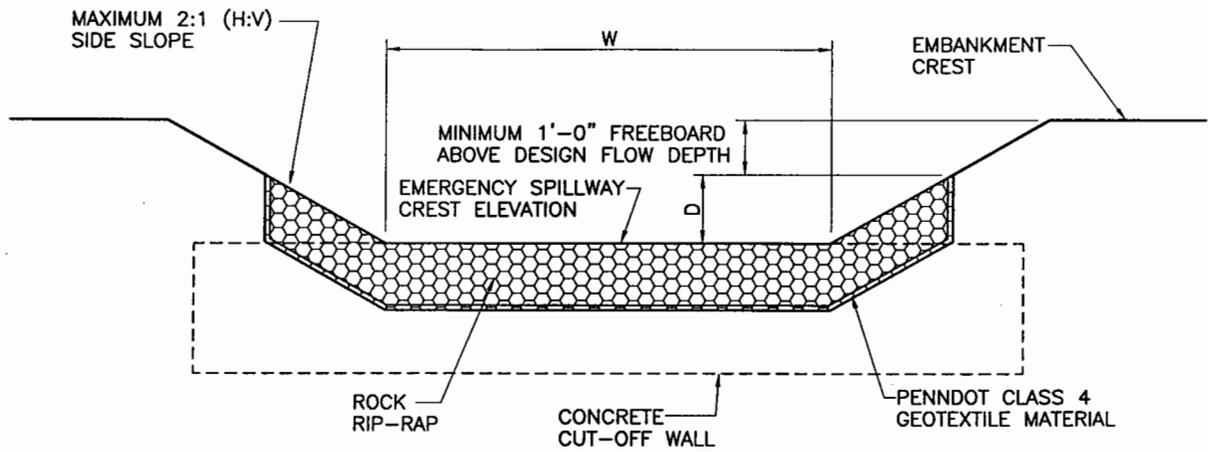
2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

## Anti-Seepage Collars

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SW-05</b>
				Date: 02/03/05

Drawing No. 8.7.4.9



**NOTE:**

RIP-RAP DESIGN DATA AND DIMENSIONS  
"W" AND "D" TO BE SPECIFIED ON DETAIL.

**DAUGHERTY TOWNSHIP**  
Beaver County, PA

2182 Mercer Road  
New Brighton, Pennsylvania 15066-2639

Phone: (724) 846-5337 Fax: (724) 846-6481

**Rip-Rap Emergency Spillway**

REVISIONS				DRAWING
NO.	DATE	NO.	DATE	
				<b>SW-06</b>
				Date: 02/03/05