PART 5

DESIGN AND IMPROVEMENT STANDARDS

SECTION 501. PURPOSE

The purpose of this Part is to provide reasonable design and improvement standards for public improvements related to subdivision and land development. This Part combines design and improvement specifications which comply with sound engineering and design with suitable improvement standards.

SECTION 502. GENERAL

The applicant shall provide all improvements required by this Ordinance and any other applicable State or Federal regulation. The following design principles, standards, specifications and requirements will be applied by the Miller Township Board of Supervisors, the Township and County Planning Commissions, and the Township Engineer in their review and evaluation of all subdivision and land development plan applications. The standards and requirements contained herein shall be considered the minimum for the promotion of the public health, safety, convenience, and general welfare.

1. Where literal compliance with the standards and requirements contained herein is clearly impractical, the Miller Township Board of Supervisors following recommendations from the Township and County Planning Commissions, and the Township Engineer may modify the requirements in accordance with the process set forth in PART 9 of this Ordinance.

2. Subdivision and Land development plans shall give due consideration to any "Official Plans" of the Township or to such parts thereof as may be approved.

SECTION 503. SITE DESIGN

The purpose of good Subdivision and Land Development design is to assist in (1) creating functional and attractive developments, (2) minimizing adverse effects and impacts of development, and (3) ensuring that the project will become an asset of the community. To promote this overall purpose, Subdivision and Land Development plans in the Township should conform to the following site design guidelines which will result in a well-planned and constructed community. These guidelines and standards are intended to encourage improved site design without adding unnecessarily to development costs.

1. Land which is unsuitable for development due to hazards to life, safety, health or property shall not be subdivided or developed until such hazards have been eliminated or unless adequate safeguards against such hazards are provided for in the subdivision or land development plan. Unsuitable characteristics for subdivision and land development include, but may not be limited to:

A. Land subject to flooding;

B. Land, which if developed, will aggravate a flooding condition upon other land;

C. Land subject to subsidence;

D. Land containing significant slope;

E. Land subject to ground and water pollution; and,

F. Land containing wetlands.

2. Before laying out lots and structures on a site, developers should make an analysis of the site that addresses issues such as site surrounding, geology and soil, topography, climate, existing vegetation, structures, road networks, visual features, and past and present use of the site.

3. The design of the development should take into consideration existing local, county and regional plans for the community.

4. Development of the site shall be based on the site analysis. To the maximum extent practicable, development shall be located to preserve natural features of the site; to avoid areas of environmental sensitivity; to minimize negative impacts and alteration of natural features; and to avoid areas unsuitable for development.

5. Development and improvements shall be designed to avoid adversely affecting ground water and water recharge; to reduce cut and fill; to avoid unnecessary impervious cover; to prevent flooding; and to provide adequate access to lots and sites.

6. Lot and block layout should be designed to permit the safe, efficient, and orderly movement of vehicular and pedestrian traffic into, out of, through and within the site.

SECTION 504. BLOCKS

The length, width, shape, and design of blocks shall be based on the site analysis and the intended use proposed for the site.

1. DIMENSIONS. Blocks shall not exceed one thousand six hundred (1,600) feet in length and shall be of sufficient depth to permit two (2) tiers of lots, except as otherwise provided herein. Blocks shall not be less than five hundred (500) feet in length.

SECTION 505. LOTS

1. GENERAL STANDARDS

A. The size, shape, and orientation of lots shall be appropriate to the type of development,

topography, natural features, setbacks, and land use contemplated.

B. Every lot shall abut a street or private right-of-way or be added to a lot with street frontage, or access to a private right-of-way as a means of access.

C. Side lot lines should be substantially at right angles or radial to street lines.

D. Where feasible, lot lines should follow municipal boundaries rather than cross them, in order to avoid jurisdictional problems.

E. All remnants of land (areas remaining after subdivision) shall conform to the lot area and configuration requirements.

F. Lot size and density shall conform to the prevailing municipal zoning ordinance where one exists.

2. ENVIRONMENTAL SELF SUFFICIENCY

Each new lot created in Perry County shall be designed in such a manner to be individually self sufficient for both water supply and sewage disposal or be connected to available public or private water and sewer facilities.

3. LOT FRONTAGE

A. All lots shall abut an existing or proposed public street except where:

1). Private streets are permitted in developments where the ownership arrangements are set up as a condominium or homeowners association.

2). A private access drive is permitted to provide an access to not more than three (3) lots or dwelling units. The width of the private minor street/easement/right-of-way shall be not less than fifty (50) feet. If any additional lot(s) beyond the three (3) are proposed on the access drive, the drive shall be required to be designed and constructed to become a public street.

4. DIMENSIONS AND AREAS OF LOTS. The dimensions and areas of lots, unless regulated by a local zoning ordinance, shall conform to the following standards and requirements:

A. Lots not serviced by either public sewer or public water supply are required to be two hundred (200) feet wide at the front building setback line and a minimum of two (2) acres of net lot area.

B. Lots serviced by private sewer and public water supply are required to be one hundred (100) feet wide at the front building setback line and a minimum of one (1) acre of net lot area.

C. Lots serviced by public sewer and private water supply are required to be eighty five (100) feet wide at the front building setback line and a minimum of ten thousand (10,000) square feet of net lot area.

D. Lots serviced by both a public sewer system and a public water supply shall conform to the following requirements:

Table 5.1 - Lot Requirements (Public Sewer System and a Public Water Supply)

	Minimum Lot Width Required at the Front Building Setback Line	**Minimum Net Lot Area Required per Dwelling Unit.**
Single Family Detached Dwelling	75 Feet	7,500 Square Feet
Single Family Semi-detached Dwelling	50 Feet	5,000 Square Feet
Single Family Attached Dwelling	18 Feet (Interior) 33 Feet (Each end)	2,400 Square Feet
Two Family Detached Dwelling	75 Feet	7,500 Square Feet
Two Family Semi-detached Dwelling	60 Feet	3,000 Square Feet
Multi-family Dwelling	100 Feet	2,400 Square Feet

5. SETBACK LINES

Building setback lines must conform to the applicable municipal zoning ordinance. Where no such ordinance exists, the minimum setback from the right-of-way line is as follows:

A. Front Yard Building Setback Lines

1). Where the street right-of-way width meets the requirements of this ordinance.

Table 5.2 - Front Yard Building Setback Requirements

Street Type	Minimum setback distance from the required street right-of-way line
Arterial (None presently)	Forty (40) feet
Collector (SR 0849)	Thirty (30) feet

Minor/ Local (All other streets, roads and private right-of-ways)	Twenty-five (25) feet

2). Front yard building setback lines for subdivisions or land developments fronting on streets which do not meet the right-of-way requirements of the ordinance for arterial, collector, or minor streets, shall be measured from the centerline of the existing street based on the designation of the commission as to the type of street, and the minimum setback shall be as follows:

Table 5.3 - Front Yard Building Setback Requirements

(For streets not meeting the minimum required right-of-way widths)

Street Type	Minimum building setback distance from the required street centerline
Arterial Highway (None presently)	As required by the Commission
Collector Street (SR 0849)	Sixty (60) feet
Minor Street (All other streets, roads and private right-of-ways)	Fifty (50) feet

B. Side and Rear Building Setback Lines

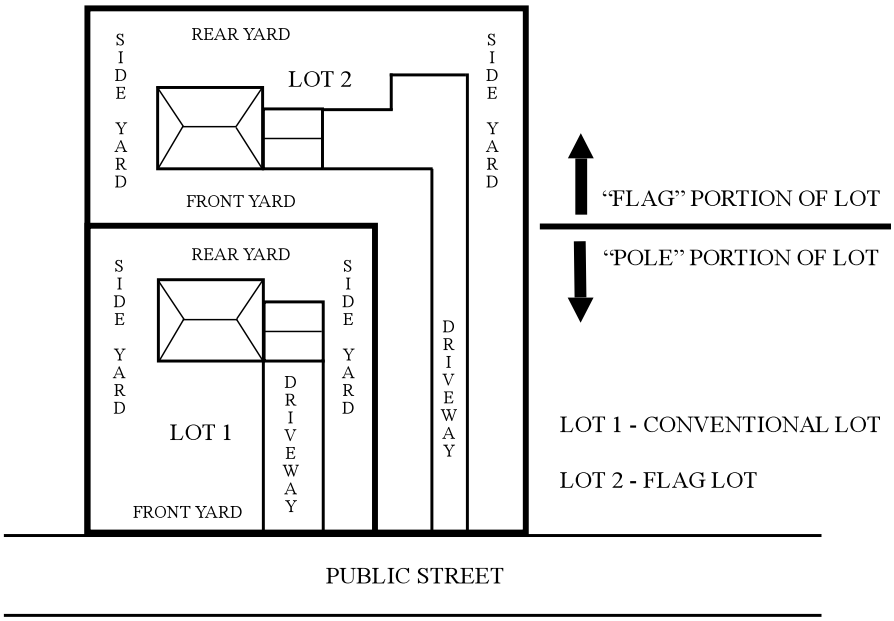
1). Building setback lines shall not be less than fifteen (15) feet from the side lot lines and twenty-five (25) feet from the rear lot line.

2). In a recreational vehicle park or campground side and rear building setback lines shall not be less than ten (10) feet from the lot line on each side and from the rear lot line of each recreational vehicle or campground lot and not less than twenty-five (25) feet from the recreational vehicle park or campground property line on the sides and rear not adjacent to a dedicated public street right-of-way.

6. FLAG-LOTS

Flag-lots shall only be permitted where specifically provided for in accordance with this Ordinance, and in compliance with the following:

Figure 5.1 - Flag-Lot Illustration



A. For the purposes of this Section a flag-lot shall be described as containing two parts: (1) The "flag" shall include that portion of the lot that is the location of the principal and accessory buildings. (2) The "pole" shall be considered that portion of the site that is used for vehicular access between the site and its adjoining road.

B. Requirements for the Flag

1). The minimum lot area and lot width requirements of the Municipal Zoning Ordinance shall be measured exclusively upon the flag.

2). For purposes of determining required yards and setbacks, the following shall apply:

Front yard - The area between the principal structure and that lot line of the flag which is most parallel to the street providing vehicular access to the site. Additionally, all areas of the pole shall be considered to be within the front yard;

Rear yard - The area between the principal structure and that lot line of the flag that is directly opposite the front yard, as described above; and,

Side yard - The area between the principal structure and that one (1) outermost lot line which forms the flag and pole, plus the area on the opposite side of the principal structure. (See the preceding Flag-Lot Figure 5.1. for a graphic depiction of the yard locations);

3). The flag-lot shall contain adequate driveway dimension for vehicular backup so that ingress to, and egress from, the lot is in the forward direction.

C. Requirements for the Pole

1). The pole shall maintain a minimum width of fifty (50) feet.

2) The pole shall not exceed six hundred (600) feet in length, unless additional length is needed to avoid the disturbance of productive farmlands or some other significant natural or cultural feature.

3). No part of the pole shall be used for any portion of an on- lot sewage disposal system, well, nor any other improvement except a driveway and other permitted improvements such as landscaping, fencing, utility connections to off- site facilities, mailboxes, and signs.

4). The driveway contained within the pole shall be located at least five (5) feet from any adjoining property line, and twenty (20) feet from any existing structures on the site or any adjoining property.

SECTION 506. DRIVEWAYS AND SERVICE DRIVES

The following standards shall apply to driveway construction within the public right-of-way in any subdivision and land development:

1. Private driveways on corner lots shall be located at least forty (40) feet from the point of intersection of the nearest street right-of-way lines. Private driveways shall be setback a minimum of five (5) feet from side property lines unless a joint use driveway is proposed.

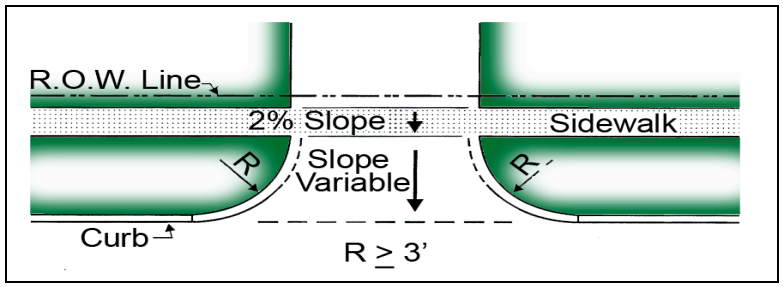
2. All driveways on a State Highway must have a valid highway occupancy permit from the PA Department of Transportation.

3. JOINT DRIVEWAYS. Joint or common driveways serving no more than three (3) lots or three single-family dwelling units are permitted and shall be designed in accordance with the standards of this section.

4. CURB CUTS. The minimum curb cut or driveway width at the cartway edge shall be ten (10) feet. The maximum curb cut or driveway width at the cartway edge shall be twenty five (25) feet.

5. CURB ENTRANCES. A curb return entrance is illustrated in Figure 5.2. When curb return entrances are used, the curb shall have a minimum radius of three (3) feet. However, any driveway entering into PennDOT right-of way shall be designed in accordance with PA Code Title 67, Chapter 441.

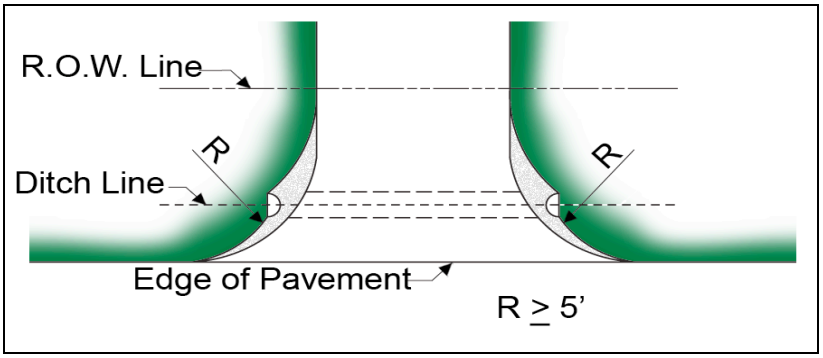
Figure 5.2 - Typical Curb Return Entrance
Modified from Source: AASHTO



(Source: Pennsylvania Standards for Residential Site Development, 2007)

6. NON-CURBED ENTRANCES: Non-curbed driveway entrances shall have a minimum edge-of-pavement radius of five (5) feet as illustrated in Figure 5.3

Figure 5.3 - Typical Non-curbed Driveway Entrance
Modified from Source: AASHTO



(Source: Pennsylvania Standards for Residential Site Development, 2007)

7. DRIVEWAY GRADES.

The grades on service drives or driveways shall not be less than one half (1/2) percent and shall not exceed the following:

A. Eight (8) percent when access is to a Collector Street;

B. Ten (10) percent when access is to a Local Street.

C. Where a proposed driveway or service drive passes through areas exceeding fifteen (15) percent slope, a centerline profile of the driveway or service drive will be required to be displayed on the plan, and the applicant will need to submit a stormwater management plan.

8. DRIVEWAY ENTRANCES.

A. Driveway entrances onto a municipal street shall be constructed according to the municipal construction standards for such access within the street right-of-way.

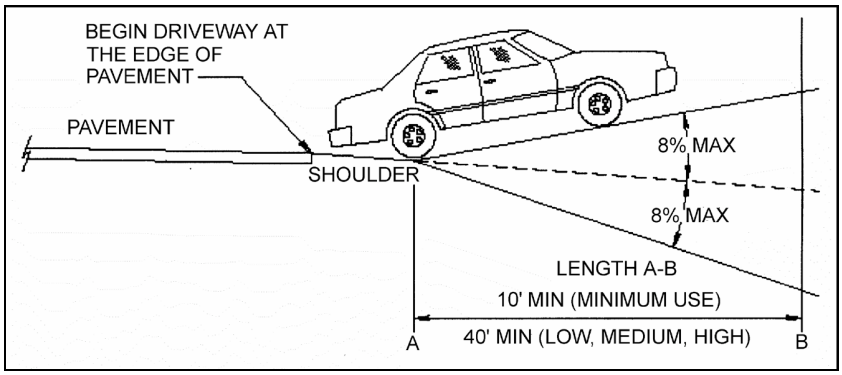
B. Driveway entrances onto a state street within the street right-of-way shall be surfaced to their full width. The type of surface may be either concrete or asphalt, constructed following the specifications in Penn DOT Publication RC-25M Type 6 Shoulder (asphalt) or Type 2 Shoulder (concrete).

C. Driveway entrances along streets, where curbs are not required, shall be constructed to provide proper drainage along the streets and from the streets by the continuation of gutters, swales, or ditches. Such continuation may be provided by having an approved pipe of not less than eighteen (18) inches in diameter across such driveway entrances.

D. Driveway entrances along streets, where curbs are not required, shall be constructed so that the driveway meets the edge of the cartway as a continuation of at least the slope from the crown of the street for not less than five (5) feet.

E. Driveways serving single-family residences shall intersect streets at angles of no less than seventy-five (75) degrees. All other driveways or service drives shall intersect streets at right angles.

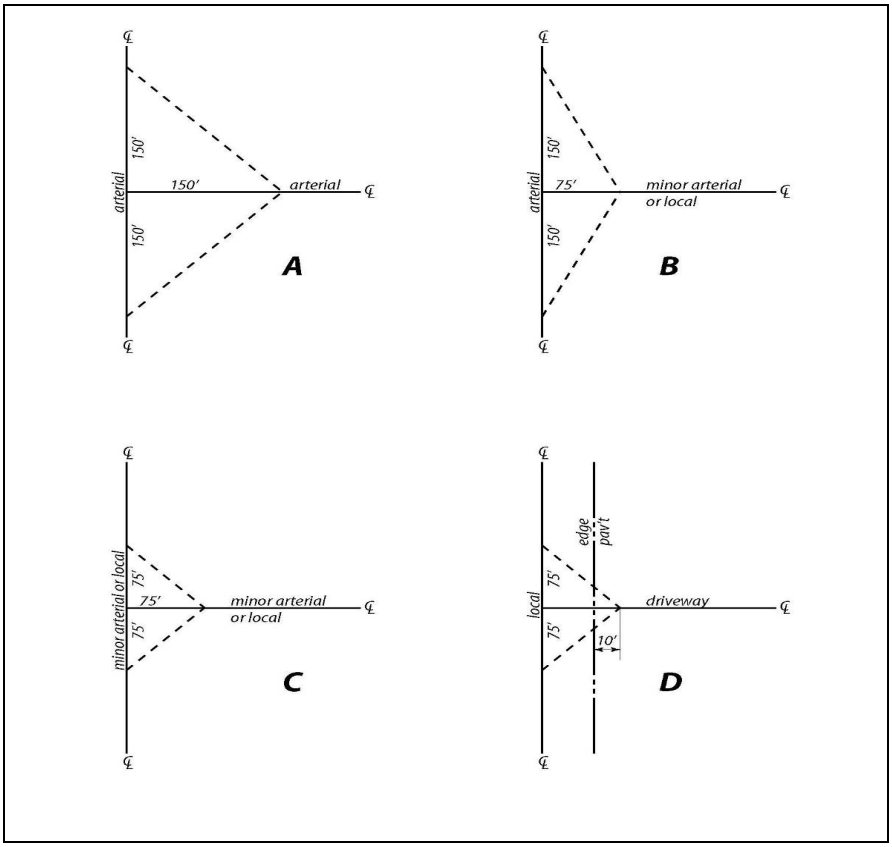
Figure 5.4 – Typical Driveway Profile



9. SIGHT DISTANCE

A. The clear-sight distance for driveways shall be in accordance with Diagram D in Figure 5.5.

Figure 5.5 – Typical Clear-Sight Triangles



10. DRIVEWAY PROFILE

Driveway profiles shall provide efficient access to the abutting residential street, allow for low-speed ninety- (90) degree turns into the driveway, and provide safe access to the residential garage or parking area. The following standards shall apply:

A. Driveway grades shall not exceed ten (10) percent for the first 18 feet from the street edge of pavement.

B. Driveways serving residential dwellings shall not exceed twenty (20) percent.

C. If not jointly used, a driveway may not be placed closer than five (5) feet of an adjoining property line.

D. New driveways may not be placed closer than fifty (50) feet of another driveway.

11. JOINT-USE DRIVEWAYS, ACCESS EASEMENTS, AND PRIVATE STREET/RIGHT-OF-WAY

A. All joint-use driveways shall have a minimum cartway width of ten (10) feet, and a minimum right-of-way/easement width of fifty (50) feet.

B. Access easements/right-of-way shall be required to ensure common use of, access to, and maintenance of, joint-use driveways; such easements shall be recorded in language acceptable to the Perry County Planning Commission, and depicted on the subdivision plan. The area of shared use between parties shall be displayed by a perimeter metes and bounds description.

C. Any additional lots created after three (3) lots on the access driveway shall require construction of a public street.

SECTION 507. SIDEWALKS

1. Sidewalks shall be provided where lot sizes are less than or equal to 22,000 square feet, or where any subdivision is immediately adjacent to or within one thousand (1,000) feet of any existing or recorded subdivision or land development having sidewalks, sidewalks shall be required in all subdivision or land developments on each side of the proposed street. Where there is an existing street, sidewalks will only be required on the side of the street where subdivision or land development is proposed.

   The Perry County Planning Commission may require installation of sidewalks in any subdivision where the evidence indicates sidewalks are necessary for public safety.

2. The sidewalks shall be designed and constructed in accordance with the following requirements:

   A. Sidewalks shall be located within the right-of-way of the street and shall extend in width from the right-of-way line toward the curb line.

   B. Sidewalks must be at least four (4) feet wide. In the vicinity of shopping centers, schools, recreation areas and other high pedestrian traffic areas, sidewalks must be at least five (5) feet wide and still located within the street right-of-way.

   C. Sidewalks shall be constructed in accordance with cement concrete sidewalks in the PennDOT Publications 408 and 72 Standards.

   D. In order to provide for the drainage of surface water, sidewalks shall slope from the right-of-way line toward the curb. Such slope shall be one fourth (1/4) inch per foot.

   E. Sidewalks shall be boxed out around light standards, fire hydrants, signs, etc., with a pre-molded expansion joint, one quarter (1/4) inch in thickness.

SECTION 508. STREET SYSTEM DESIGN AND CONSTRUCTION

1. GENERAL DESIGN GUIDELINES

   A. The general arrangement, character, extent, width, grade, and location of all streets proposed shall conform to the Official Map, if one exists, and to the Community Comprehensive Plan, if one has been adopted, and shall be considered in their relation to existing and planned streets, topographical conditions, public convenience and safety, and the appropriate relation to the proposed uses of the land to be served by such streets. The arrangement, width, grade, and other design standards of streets shall conform to the provisions found herein. Further, proposed streets shall be properly related to County, Regional or State transportation plans, as have been prepared and adopted.

   B. Proposed street arrangements shall make provisions for the continuation of existing streets in adjoining areas; the proper projection of streets into adjoining undeveloped or unplanned areas; and the continuation of proposed streets to the boundaries of the tract being subdivided. This requirement applies to all streets and right-of-way.

   C. When a new subdivision adjoins unsubdivided land appropriate for subdivision, the new streets shall be carried to the boundaries of the tract to be subdivided where deemed appropriate by the Commission.

   D. Private rights-of-way fifty (50) feet in width may be approved for subdivision or land development of three (3) lots or dwelling units or less while still complying with the other driveway requirements found in section 506. Further subdivision or land development in excess of the initial three (3) lots or dwelling units using private street(s) or private right-of-way(s) shall not be permitted except if the initial private street(s) or private right-of-way(s) and any extensions thereof are dedicated, designed and improved in accordance with all applicable construction standards.

   E. Private streets for campgrounds or transient recreational vehicle parks are permitted with no less than a forty (40) foot right-of-way and an eighteen (18) foot cartway. Cartways may be of porous surface such as shale or small compacted gravel. For permanent placement of RV's, minor street improvements are required to be designed by a Pennsylvania Licensed Engineer.

   F. Streets shall be laid out to facilitate the use for which they are intended. Local access streets shall be laid out to discourage their use by through traffic and, where possible, collector and arterial streets shall be designed for use by through traffic.

   G. Streets shall be related to the topography so as to establish usable lots and satisfactory street grades.

   H. In a residential subdivision/land development of twenty-five (25) or more dwelling units shall provide for at least two (2) street connections to existing public streets.

   I. ALLEYS: Alleys shall be prohibited except if the municipality has identified in their municipal comprehensive plan or official map the need for alleys or the extensions thereof.

2. ROAD/STREET CLASSIFICATION

Three (3) functional classifications of streets and roads, as classified by the Perry County Planning Commission as determined by the Perry County Comprehensive Plan are established as follows:

A. Arterial.

This classification includes highways which provide intra-county or inter-municipal traffic of substantial volumes. Generally, these highways should accommodate operating speeds of fifty five (55) miles per hour.

These include US Routes 11/15 and 22/322, and State Routes 0274 and 0850.

B. Collector.

This classification is intended to include those highways which connect minor streets to arterial highways and generally serve intra-county and intra-municipal traffic. They may serve as traffic corridors connecting residential areas with industrial, shopping and other services. They may penetrate residential areas. Generally, these highways should accommodate operating speeds of thirty five (35) to fifty five (55) miles per hour or less.

These include State Routes 0017 and 0233.

C. Minor (Local).

This classification is intended to include streets and roads that provide direct access to abutting land and connections to higher classes of roadways. Traffic volumes will be low and travel distances generally short. These streets and roads should be designed for operating speeds of twenty five (25) to thirty five (35) miles per hour or less. Minor streets also include private streets or roads providing access to four (4) or more dwelling units or lots.

These include all other streets not listed in sections 508.2.A and 508.2.B above.

3. STREET RIGHT-OF-WAY WIDTHS

A. Minimum street right-of-way and cartway widths shall be required as follows:

Table. 5.4 - Minimum Street Right-of-way, Shoulder, and Cartway Widths

Street Type	Right-of-way	Shoulder	Cartway
Arterial (None presently)	As determined by the Perry County Planning Commission after consultation with the County and/or municipal engineer and Penn DOT.		
Collector (SR 0849)	60 feet	16 feet	24 feet (w/shoulders)

		(8 feet each side)	36 feet (curbed)
Minor/ Local (All other streets, roads and private right-of-ways)	50 feet	10 feet (5 feet each side)	24 feet (w/shoulders) 36 feet (curbed)
Cul-de-sac	50 feet	10 feet (5 feet each side)	24 feet (w/shoulders) 34 feet (curbed)
Circular turnaround of Cul-de-sac without center islands and without parking*	55 feet radius 110 feet diameter	Not Applicable	45 feet radius 90 feet diameter
Joint-Use Driveway/ Access Easement	50 feet	6 feet (3 ft per side)	14 feet (w/shoulders)
Alley or Service Drive	20 feet		20 feet

* For circular turnaround with island the minimum radii for circular turnarounds with center islands are the same as for circular turnarounds without a center island as above. For centered island, the minimum allowed travel lane width shall be twenty four (24) feet. To minimize pavement within the circular turnaround, the travel lane can be offset

B. Where a proposed subdivision abuts or contains an existing public street or road having a right-of-way width which is less than would be required by this Ordinance, sufficient additional right-of-way width shall be provided and dedicated to meet the current standards.

C. In the case of a subdivision or land development plan fronting on an existing or proposed street, the applicant/developer may be required to improve the portion of the roadway on which the proposed development fronts to meet the minimum standard as specified in this Ordinance. Road improvements shall include pavement, shoulders, embankments, gutters, berms, sidewalks and/or curbing and turning lane(s).

D. Provision for increased street width (right-of-way, cartway, or both) may be required when determined to be necessary by the Perry County Planning Commission in specific cases for:

1). Public safety and convenience;

2). Parking and/or travel in commercial and industrial areas and in areas of high density development;

3). Widening of existing streets (right-of-way) where the width does not meet with the

requirements of the preceding paragraphs;

4). Installation of utilities;

5). Ponding of stormwater runoff;

6). Storage of plowed snow;

7). Emergency parking;

8). Temporary roadway adjustments during maintenance or traffic accident situations;

9). Future improvements.

E. When a subdivision and land development is proposed which fronts on an existing municipal street, the required additional right-of-way shall be dedicated for only the proposed lots or those lots where land development is proposed. Right-of-way width dedication shall not be required for the remaining portion of the property, except (1) where the remaining road frontage is less than the required minimum lot width, or (2) where a traffic impact study warrants the need for additional right-of-way width due to the impacts of the development to that portion of the road system.

4. STREET INTERSECTION DESIGN

A. Horizontal Curves and Vertical Curves.

In order to provide adequate sight distance, facilitate traffic mobility and ensure proper alignment of streets, horizontal and vertical curve design shall be in accordance with the Pennsylvania Department of Transportation, Guidelines for Design of Local Roads and Streets - Publication No. 70M, as revised.

1). Vertical Curves shall be used at all changes of grade and shall be designed for maximum visibility. All intersections and streets shall be designed to provide adequate sight distance with regard to both horizontal and vertical alignment in accordance with A Policy on Geometric Design of Highways and Streets, AASHTO, current edition.

a). Where tangent street lines deflect from each other at any one point, lines must be connected with a true, circular curve. The minimum radius of the center line for the curve must be as follows:

Table 5.5 - Minimum Street Radius

Type of Street	Minimum Radius
Arterial (None presently)	500 feet

Collector (SR 0849)	300 feet
Minor/ Local (All other streets, roads and private right-of-ways)	150 feet

b). Straight portions of the street must be tangent to the beginning or end of curves. Except for minor streets, there must be a tangent of at least one hundred (100) feet between curves.

B. Extensions.

Short extensions of existing streets with lesser right-of-way and/or cartway widths than above may be permitted by the Perry County Planning Commission, provided that no section of the new right-of-way shall be permitted which is less than forty (40) feet in width.

C. Grades.

The grades of streets shall not be less than the minimum or more than the maximum requirements listed below:

Table 5.6 - Minimum and Maximum Street Grades

Type of Street	Minimum Grade	Maximum Grade
Arterial (None presently)	As determined by the Perry County Planning Commission after consultation with the Township/Borough Traffic Engineer and Pennsylvania Department of Transportation.	
Collector (SR 0849)	1%	7%
Minor/ Local (All other streets, roads and private right-of-ways)	1%	10%
Alleys	1%	12%

E. Intersection Design

1). Intersection Angle.

Intersections must be nearly right angles wherever possible. However, no street shall intersect another at an angle of less than seventy-five (75) degrees.

2). Intersection Leveling Area and Grades.

Intersections shall be approached on all sides by a straight leveling area. Such leveling area shall have a minimum of fifty (50) feet (measured from the intersection of the center lines) within which no grade shall exceed a maximum of four (4)

percent.

3). Intersection Separation Distance.

Any street terminating at an existing or proposed street will do so in one of the two following ways: (1) directly across from the pre-existing or other newly proposed street as to create a four-way intersection, or (2) at least one hundred fifty (150) feet from any other intersection, existing or proposed. Offset intersections shall not be created by new streets

Intersections with an Arterial street shall be located not less than six hundred (600) feet apart, measured from centerline to centerline, along the centerline of the street.

4). Multiple Intersections.

Intersections involving the junction of more than two (2) streets/driveways are prohibited.

5). Intersection Curb Radii.

At intersections of streets the curbs or edge of pavement radii shall not be less than the following:

Table 5.7 - Minimum Simple Curve Radii at Street Intersections

Street Intersection Type	Minimum Simple Curve Radius at the Edge of Curb or Edge of Pavement
Arterial with Collector	35 feet
Collector with Collector	35 feet
Collector with Minor (Local)	25 feet
Minor (Local) with Minor (Local)	15 feet
Radius corners or diagonal cutoffs must be provided on the property lines substantially concentric with, or parallel to, the chord of the curb radius corners.	

6). Intersection Sight Distance and Clear Sight Triangles.

a). Proper sight lines must be maintained at all street intersections. Adequate sight distances shall be provided at all intersections of streets, and for driveways intersecting a street. Sight distance must be provided with respect to both horizontal and vertical alignment. Sight distance shall be measured along the centerline three and one-half (3.5) feet above grade, and ten (10) feet back from the edge of the pavement for driveways in accordance with the following:

Table 5.8 - Minimum Clear-Sight Triangle Distances

Street Type	Clear Sight Triangle
Arterial (None presently)	150'
Collector (SR 0849)	75’
Minor/ Local (All other streets, roads and private right-of-ways including joint driveways)	75’
Individual Driveways	10’

Note: Also, see Figure 5.5 - Clear-Sight Triangles on page 5-10.

b). No building or obstruction higher than thirty (30) inches above the centerline grade of the street shall be permitted in the site triangle. No signs other than traffic control signs and devices shall be permitted in the clear sight triangle.

c). The Township Engineer reserves the right to use posted speed limits or actual speed, determined by traffic study, and road grades to modify the calculation of the required sight triangles.

5. STREET CONSTRUCTION

A. General Requirements.

All street materials, construction procedures and testing requirements shall conform to the current editions of PennDOT Publication 408/2003; Publication-213; Publication 72M, Standards for Roadway Construction, Series RC-1M to 100M Publication 111M, Standards for Traffic Control Signing, Series 7700 and 7800, current edition, including all supplemental specifications, circular letters and amendments. All streets and related features shall be constructed to the line, grade and dimension shown on the plans, profiles and cross sections and typical sections as approved on the final land development plan.

B. Slope of Embankments Adjacent to Streets

Slope of embankments along streets measured perpendicular to the street centerline shall be no steeper than the following:

1). One (1) foot of vertical measurement for three (3) feet of horizontal measurement for fills.

2). One (1) foot of vertical measurement for two (2) feet of horizontal measurement for cuts.

C. Street Cartway/ Pavement Construction Standards

Minor/ Local streets shall be designed in accordance with this Part and shall be surfaced to the grades and dimensions drawn on the plans, profiles, and cross-sections submitted by the Applicant and approved by the Miller Township Board of Supervisors . Before paving the street surface, the Applicant shall install the required utilities and provide adequate underdrains and stormwater drainage for the streets, as deemed acceptable to the Miller Township Board of Supervisors and the Township Engineer. The pavement base and wearing surface must be constructed according to the following specifications.

1). General

a). Streets must be constructed to the grades and dimensions depicted on the plans, profiles, and cross sections submitted by the applicant and approved by the Miller Township Board of Supervisors after being advised by the Township Engineer.

b). Before any street construction can begin, the applicant must install the required utilities and provide, where necessary, adequate stormwater drainage from the street.

c). Pipe underdrain and pavement base drain shall be installed according to the specifications set forth in Section 610 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408, at such locations and in such quantities as determined necessary by the Township Engineer. Field conditions may cause underdrain and pavement base drain to be installed at locations not depicted on approved drawings.

2). Inspections

a). All street construction shall be subject to inspection at anytime by the Miller Township Board of Supervisor's or any assigned agent.

3). Specifications

The subgrade, subbase, base course, binder course, and wearing course of new, reconstructed, or resurfaced streets shall be designed using the DARWin Pavement Design and Analysis System or an acceptable alternate procedure that meets the requirements of the 1993 American Association of State Highway and Transportation Officials (AASHTO) Pavement Design procedures or the minimum depths indicated for each classification of street, whichever is greater, and constructed according to the following specifications:

a). Arterial Streets

The subdivider/ developer shall consult with the Township Engineer and Planning Commission in following the construction standards of the Pennsylvania Department of Transportation. In the case of a municipal-owned arterial street, the street specification shall be governed by whichever entity owns or will own the street in conjunction with the Pennsylvania Department of Transportation.

b). Collector Streets

(1). Subgrade. Prior to the installation of the subbase, the subgrade shall be prepared according to the specifications set forth in Section 210 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408.

(2). Subbase

The subbase shall consist of eight (8) inches of compacted 2A aggregate constructed in accordance with the specifications set forth in Section 350 and Section 703 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408.

(3). Base Course

The base course shall consist of five (5) inches of compacted Hot Mix Asphalt Superpave Base Course, PG64-22, 25mm mix, 3.0 to 10.0 million ESALs, conforming to Section 309 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408.

(4). Wearing Course

The wearing course shall consist of one and one half (1 ½) inches of compacted Hot Mix Asphalt Superpave Wearing Course, PG64-22, 9.5 mm mix, 3.0 to 10.0 million ESALs, SRL-G, conforming to Section 409 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408.

c). Minor/ Local Streets

(1). Subgrade. Prior to the installation of the subbase, the subgrade shall be prepared according to the specifications set forth in Section 210 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408.

(2). Subbase

The subbase shall consist of eight (8) inches of compacted 2A aggregate constructed in accordance with the specifications set forth in Section 350 and Section 703 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408.

(3). Base course.

The base course shall consist of three (3) inches of compacted Hot Mix Asphalt Superpave Base Course, PG64-22, 25mm mix, .3 to 3.0 million ESALs, conforming to Section 309 of the current edition of the Pennsylvania Department of Transportation specifications, Publication 408.

(4). Wearing course.

The wearing course shall consist of one and one half (1 ½) inches of compacted Hot Mix Asphalt Superpave Wearing Course, PG64-22, 9.5 mm mix, .3 to 3.0 million ESALs, SRL-M, conforming to Section 409 of the current edition of the Pennsylvania Department of Transportation Specifications, Publication 408.

a). Street crown and curbs.

(1). A street must be designed to provide for the discharge of surface water from its cartway and right-of-way.

(2). The slope of the crown on a street shall be not less than one eighth (1/8) of an inch per foot and not more than three eighths (3/8) of an inch per foot measured perpendicularly from the centerline of the street, unless special designs, such as super elevation, required alternate slope designs which shall be reviewed on an individual basis by the Municipality.

4). Shoulders

Shoulders shall be provided where curbing is not required and shall conform to the Pennsylvania Department of Transportation Type 6 Shoulders as shown on PennDOT RC-25M.

5). Curbs

Whenever a proposed subdivision or land development shall average three to more dwelling units or lots per gross acre, or where the subdivision/land development is within one thousand (1,000) feet of an area with existing curbing; curbs shall be installed.

a). Curbs shall be installed in all subdivision and land developments in order to control stormwater runoff, prevent erosion, prevent the deterioration of public streets and provide a contained area for vehicular movements. In cases where curbs are not provided, stabilized/reinforced shoulders of six (6) to eight (8) feet in width shall be provided.

b). Curbs shall be constructed on both sides of the interior streets and on the side of any street that bounds the development.

c). Curbs shall be constructed of concrete and designed as vertical or slant type. The height of vertical curbs shall be eighteen (18) inches. The width of vertical curbs shall be eight (8) inches. The height of slant curbs shall be twelve (12) inches at the face and sixteen (16) inches at the back of the curb. The width of slant curbs shall not be less than fourteen (14) inches.

d). Curbs shall be inspected by the Township Engineer after the forms or grade

pins and string lines for slip forming have been placed, and after completion of all work.

e). Terminal concrete curb ends shall have an exposed face of two (2) inches and be tapered two (2) feet.

f). Backfill must be placed within forty-eight (48) hours after slip forming or removal of curb forms and the backfill shall be compacted in place along the rear face of the curb within six (6) of the top of the curb.

g). When curbing is to be removed to construct a driveway or access drive, the length of curbing to be removed shall be carried to the nearest expansion joint or saw cut if the joint is located less than five (5) feet from the end of the curb removal.

h). Vertical curb height at driveway entrances may be reduced to a minimum of one and one half (1 1/2) inches for driveway entrances along streets where curbs are required.

i). No partial breakout of the curb shall be permitted**.** No cutting of the curb shall be permitted without approval by the Township Engineer.

j). Curb ramps must be installed in accordance with ADA requirements.

7). Street Trees

a). Trees shall be permitted within the public right-of-way of streets.

b). Such trees shall be two (2) inch to two and one half (2 1/2) inch in diameter, measured at chest height, when planted, and shall be spaced at the intervals no greater than forty feet along both sides of each street or determined from the anticipated crown width of the tree at maturity. The planting strip area between the curb and sidewalk shall be seeded.

c). Species shall be selected according to the following criteria:

(1). Be able to survive two (2) years with no irrigation after establishment.

(2). Be of native origin.

SECTION 509. OTHER STREET DESIGNS AND STANDARDS

1. Dead End Streets and Temporary Cul-de-Sacs

Dead end streets shall be prohibited, except when the developer designs and constructs temporary cul-de-sac streets on the developer's own land in order to permit future street extensions into adjoining properties. Temporary cul-de-sacs, upon approval of the Township Engineer, may be constructed without asphalt base or wearing course. The developer may be

exempt from providing curbing at the terminus of temporary cul-de-sacs, unless curbs are required for drainage control. A temporary cul-de-sac shall be removed by the developer and replaced with the permanent street upon extension of the existing street.

2. Cul-de-Sacs and Self-Looping Single Access Streets

A. Permanent cul-de-sacs and self-looping single access streets shall not exceed 15 (fifteen) single-family dwellings. The length of cul-de-sac shall not exceed one thousand (1,000) feet in length. In developments with more than fifteen (15) dwellings only twenty (20) percent of the dwelling units in a development shall be served by streets terminating in cul-de-sacs.

B. The minimum cul-de-sac length shall be two hundred fifty (250) feet.

C. Cul-de-sac streets, whether permanently or temporarily designed as such, shall be provided with a snow removal easement with a width of twenty (20) feet located at the terminus of the cul-de-sac street for plowed snow during the winter months.

D. Drainage of cul-de-sac streets shall preferably be towards the open end. If drainage is toward the closed end it shall be conducted away in an underground storm sewer.

E. Turnaround radius at the end of cul-de-sacs shall comply with Section 508.3.A of this Ordinance.

3. Snow Dump Areas in Turnaround of a Cul-de-sac

A. In permanent turnaround, a snow dump area shall be provided within the turnaround right-of-way and delineated on the subdivision and land development plan.

B. Snow dump area shall be a minimum of thirty (30) feet in width and shall extend to the full depth of the cul-de-sac right-of-way from the curb or edge of cartway.

C. Snow dump area shall not encroach on driveways, trees, fire hydrant, water or gas shutoff valves, mail box, street light, utility pole or similar encroachments.

4. PARTIAL AND HALF STREETS

A. New half or partial streets shall not be permitted, except where the Applicant justifies to the Miller Township Board of Supervisors that it is essential to the reasonable subdivision of a tract in conformance with the other requirements and standards of these regulations, and where, in addition, satisfactory assurance for dedication of the remaining part of the street can be obtained.

B. The dedication of half streets at the perimeter of new subdivisions is prohibited.

5. HAMMERHEAD STREETS

Streets less than two hundred fifty (250) feet and serving six (6) lots or fewer may be designed as symmetrical “hammerheads,’ in accordance with standards contained in

Residential Streets (latest edition), coauthored by the American Society of Civil Engineers, as amended. Such hammerheads shall be designed to facilitate three-point turns. The minimum dimensions of hammerheads shall be thirty (30) feet by eighty five (85) feet with curbing of thirty (30) feet by eighty five (85) feet which includes four-foot shoulders. The right-of-way diameter for the hammerhead shall be 10 feet greater than the edge of curb or shoulder.

SECTION 510. STREET NAMES

1. Names of new streets shall not duplicate or display similarities in sound or spelling with respect to existing or planned street names, or approximate such names by the use of suffixes such as "lane", "way", "drive", "court", "avenue".

2. In approving the names of streets, cognizance should be given to existing or planned street names within the postal delivery district served by the local post office and service areas of emergency service providers.

3. New streets shall bear the same name or number of any continuation of alignment with an existing or planned street.

SECTION 511. STREET SIGNS

1. Where signs are required in conjunction with a subdivision and or land development plan, it shall be the responsibility of the applicant/ developer to provide street name signs and traffic control signs for the development in accordance with the Township's minimum specifications for compliance with liquid fuels reimbursement and E 9-1-1 addressing and safety.

   A. The design and placement of traffic control and other street signs placed in a public right-of-way shall follow the requirements specified in the most current edition of the FHWA Manual of Uniform Traffic Control Devices for Streets and Highways. The manual shall also be used for traffic control signs on non-public streets.

   B. At least one (1) street-name sign pole shall be placed at each intersection identifying all crossing street names. Signs shall be placed so that they do not obstruct sight distances, and shall be under light standards if present. The design of street-name signs shall be consistent, of a style appropriate to the community, of a uniform size and color, and erected in accordance with any set Township standards.

   C. At signalized intersections, street signs shall be located on the overhead arm supporting the traffic signal, otherwise suitably suspended over the intersection. Street clearance shall be a minimum of sixteen (16) feet and six (6) inches from the bottom of any sign or supporting equipment and the top of the paved surface.

SECTION 512. MONUMENTS AND MARKERS

Monuments and markers must be placed by a Professional Land Surveyor so that the scored or marked point coincides exactly with the point of intersection of the lines being monumented.

1. Location of Monuments

    A. At least two (2) corners of the boundary of the original tract of the development or subdivision shall be monumented.

    B. A minimum of two (2) monuments shall be set on the street right-of-way lines.

    C. At such intermediate points as may be recommended by the Miller Township Planning Commission.

2. Location of Markers

    A. At all lot corners except those monumented.

    B. By the time the property is offered for sale.

3. Construction of Monuments and Markers

    Monuments and markers shall be the following sizes and made of the following materials:

    A. Monuments shall be six (6) inches square or four (4) inches in diameter and shall be thirty- (30) inches long. Monuments shall be made of concrete, stone or by setting a four (4) inch cast iron or steel pipe filled with concrete.

    B. Markers shall be three quarters (3/4) of an inch square or three quarters (3/4) of an inch in diameter and twenty-four (24) inches long. Markers shall be made of iron pipes or iron or steel bars.

    C. Monuments and markers must be placed so that the scored or marked point coincides exactly with the point of intersection of the lines being monumented. They must be set so the top of the monument or marker is level with the finished grade of the surrounding ground. Monuments must be marked on top with a copper or brass plate or dowel set in concrete.

SECTION 513. LIGHTING

These lighting requirements provide appropriate standards to ensure adequate nighttime safety and security while minimizing the spillover of light and glare on operators of motor vehicles, pedestrians, and land uses near the light source. It is the safety, welfare, nuisance, and hazardous aspects of lighting that form the basis of these regulations.

1. Lighting shall be required in certain subdivisions and land developments along pedestrian walkways (Sidewalks, trails, paths, etc.), entryways, and parking areas.

2. Streetlights shall be provided with the construction of all new streets at all street intersections and all other locations considered necessary for safety reasons as approved by the Miller Township Board of Supervisors.

3. The height and shielding of all lighting facilities shall provide for proper lighting without being a hazard to drivers or a nuisance to surrounding landowners.

SECTION 514. WATER SUPPLY

Each new dwelling unit, or commercial operation, proposed in Miller Township shall be individually self-sufficient for water supply and the water supply system. The Applicant shall provide an adequate and potable water supply or distribution system to service the proposed subdivision or land development which shall consist of 1. An individual private well; 2. A proposed connection to a municipal water supply; or 3. The proposed creation of a private community water supply system maintained and operated in accordance with the PA Department of Environmental Protection (DEP). The purpose of these provisions are to ensure that each dwelling unit and each commercial and industrial building in all subdivisions hereafter granted approval shall have an adequate supply of potable water for domestic use and for fire protection.

1. ON-LOT WATER SUPPLY/ WELL

    A. Where there is no existing public water supply the Applicant shall provide an individual on-lot water supply system in accordance with the standards required by the Pennsylvania Department of Environmental Protection (DEP).

    B. Easements may be established in accordance with Section 518.2 to provide access to off-lot water service. Aside from the requirement to display such easement area on the plan, a plan note regarding construction and maintenance responsibility of facilities within the easement area is also required.

    C. The subdivision and/or land development plan must demonstrate compliance with the applicable well isolation distance established by the Pennsylvania Department of Environmental Protection (DEP) with respect to both proposed and existing on-lot sewage systems.

2. PUBLIC WATER SUPPLY

    Where there is an existing public water supply system within one-thousand (1,000) feet from a proposed subdivision and/or land development site and such public water system has adequate planned capacity and is willing to serve that subdivision or land development, the Applicant shall provide plans demonstrating how the proposed subdivision and/or land development will connect to the existing public water supply system in accordance with the municipality(s) specifications for the connection.

A. Where connection to a public water supply is possible or feasible, the plan for the installation of such water supply system must be prepared for the development with cooperation of the appropriate water utility company and reviewed by the Municipal Engineer.

B. Where a public water supply system is not feasible for the proposed development, as evidenced in the Hydrogeology/Water Facilities Study, developer shall provide information related to the construction and installation of a centralized community water supply system.

3. CENTRALIZED COMMUNITY (PRIVATE) WATER SUPPLY SYSTEM

The design and installation of a central community water supply system shall be subject to the approval of the Miller Township Board of Supervisors and the Pennsylvania Department of Environmental Protection (PADEP).

A. Standards and materials for the construction of any central community water supply system shall meet or exceed those requirements described in the Public Water Supply Manual of the PADEP and shall be subject to approval by the Township Engineer. Where a permit is required by the PADEP, it shall be presented as evidence of such review and approval before construction of the system will commence.

B. Where the central community water supply system is proposed under the jurisdiction of the Pennsylvania Public Utilities Commission (PUC), the water supply study shall also incorporate those items of information required by the PUC.

C. The central community water system shall be designed to furnish an adequate supply of water to each lot, with adequate water main sizes and fire hydrant locations to meet the specifications of the Middle States Department Association of Fire Underwriters. A technical study shall be submitted to the Miller Township Planning Commission for review by the Township Engineer and Local Fire Department.

D. All suitable agreements, including financial guarantees shall be established for the ownership and maintenance of the system. Ownership and maintenance of the central community water system shall be the responsibility of an organization formed and operated in accordance with Section 518 of this Ordinance. Such a system shall be designed and constructed in a manner that would permit adequate connection to a public water supply system in the future.

E. Ground water for community water systems must conform to the PADEP requirements and standards. A minimum of two (2) sources of ground water must be provided for each community water system. Each groundwater source shall be capable of supplying the average daily demand of the proposed dwelling units.

SECTION 515. SEWAGE SERVICE FACILITIES

1. Each new lot created shall be self-sufficient for sewage disposal and the sewage disposal system shall be public, community or individually owned, maintained and operated.

2. As specified in Article 4, all plan submissions must be accompanied by the appropriate Sewage Facilities Planning Module for subdivision land development provided by the PADEP. All planning module reviews shall conform to the Pennsylvania Sewage Facilities Act of 1965, P.L. 1535, No. 537, as amended; DEP's Chapter 71 regulations, Administration of Sewage Facilities; the Municipality's Act 537 Plan; and this and any other Municipal Ordinances.

3. INDIVIDUAL (ON-LOT) SEWAGE DISPOSAL

   A. Where the installation of public sanitary sewer system is not feasible, the Applicant shall provide evidence each lot could be adequately supported by an individual on-lot sewage disposal system. All such individual on-lot sewage systems shall be designed and constructed in accordance with the "Rules and Regulations of the PADEP.

   B. Easements for individual on-lot sewage systems may be established in accordance with Section 518.2 to provide access to off-lot sewer systems. Aside from the requirement to display such easement area on the plan, a plan note regarding construction and maintenance responsibility of facilities within the easement area is also required.

4. PUBLIC SEWAGE SYSTEMS

   A. Where a public sanitary sewage system exists within one thousand (1,000) feet of the subdivision and/ or land development site, the Applicant shall provide plans demonstrating how the proposed subdivision and/or land development will connect to the existing public sewer system in accordance with the municipality(s) specifications for the connection.

   B. The system shall be designed by a Registered Professional Engineer and approved by the Township Engineer.

   C. Sanitary sewer systems shall not receive stormwater contribution.

5. CENTRALIZED COMMUNITY SANITARY SEWAGE SYSTEMS

   A. A central community sanitary sewage facility shall be permitted if it can be shown that such an approach would provide more reliable and effective treatment of waste than individual on-lot systems, or if a central community system is required as part of cluster or open space development.

   B The design and installation of a central community sanitary sewage facility shall be subject to the approval of the PADEP.

C. The system shall be designed by a Registered Professional Engineer and approved by the Township Engineer.

D. Central community sanitary sewage facilities shall be located on a separate lot under the ownership of an organization in accordance with Section 518 of this Ordinance. The lot shall be used solely for the central community sanitary sewage facility. The area of the lot shall be of sufficient size to accommodate the system, the required area for a complete alternate or replacement system, and all required setbacks.

SECTION 516. FIRE HYDRANTS

1. Where the Applicant is required to provide a public or centralized community water system for the subdivision and land development, the Applicant shall also provide fire hydrants suitable for coupling with fire equipment serving the Municipality shall be installed as specified by the Insurance Services Offices of Pennsylvania.

2. The fire protection system shall be designed by a Registered Professional Engineer and approved by the Township Engineer, if applicable.

3. The location performance standards for fire hydrants shall meet the following standards and shall be approved by the Miller Township Board of Supervisors following review and recommendation by the assigned Municipal Engineer if applicable and local fire department.

   A. All fire hydrants will be located on an eight (8) inch line or a looped six (6) inch line. Where a dead end line is required to contain a fire hydrant, the portion of the line between the main loop and the hydrant shall have a minimum diameter of eight (8) inches.

   B. Fire hydrants shall be spaced in a development so that all proposed buildings will be no more than four hundred (400) feet from the hydrant measured along traveled ways.

   C. All central community water systems must provide a minimum of 500 GPM at a residential pressure of 20psi for a two (2) hour period.

SECTION 517. COMMON FACILITIES

1. OWNERSHIP STANDARDS

   Facilities to be held in common, such as central community water supply, stormwater management facilities, or community sewage service systems shall be held using one of the following methods of ownership, subject to the approval of the Miller Township Board of Supervisors.

A. Homeowners Association. The facilities may be held in common ownership by a Homeowners Association which is formed and operated in accordance with the provisions of Section 517.2 of this Ordinance.

B. Condominium. The facilities may be held as common element under a condominium agreement. Such agreement shall be in conformance with the Pennsylvania Uniform Condominium Act as amended.

2. HOMEOWNERS ASSOCIATION

Homeowners associations will be governed in accordance with any applicable laws of the Commonwealth of Pennsylvania. Where required, the organizational framework of the homeowners association shall be described in a report forwarded to the Miller Township Board of Supervisors and the Township Solicitor. At a minimum, the following information and standards shall be met prior to final approval of the subdivision or land development:

A. By-laws describing the formation and duties of the association, including the responsibilities for maintenance of common open space areas, shall be defined and presented to the Miller Township Planning Commission for review and approval as part of the final plan submission.

B. Association membership shall be mandatory by all residents served by the common facilities. Membership and voting rights shall be defined.

C. The rights and duties of Miller Township and members of the association, in the event of a breach of covenants and restrictions, shall be defined.

D. The by-laws shall include a statement, which grants to the association the legal authority to place liens on the properties of members who are delinquent in the payment of their dues. The by-laws shall also grant the Miller Township Board of Supervisors such power, but not the duty, to maintain the common facilities, and to assess the cost of the same as provided in the PA Municipalities Planning Code, Act 247.

3. MAINTENANCE STANDARDS

A. The common facility (Ex. sanitary and storm sewage system, detention pond, community water systems, swimming pools, ponds, common ground, playgrounds, etc.) shall be operated and maintained by a professional organization specializing in the required services and approved by the PCPC. The agreement between the association or condominium and the professional organization shall be subject to review by the Township Solicitor and approved by the Board of Supervisors.

SECTION 518. EASEMENTS

1. UTILITY

Easements shall be provided for poles, wires, conduits, storm, and sanitary sewer lines, gas, water and heat mains, and other utilities intended to serve the abutting lots and for access to facilities. The minimum width of utility easements shall be thirty (30) feet. Wherever possible such easements shall be centered on the side or rear lot lines, or along the front lot lines.

2. STORMWATER, SANITARY SEWER, AND CLEAR WATER COLLECTION SYSTEMS

Where a subdivision and/ or land development is traversed by storm water, sanitary sewage or clear water collection system facilities, a utility easement shall be provided. In no case shall the easement be less than thirty (30) feet in width. Additional width may be required by the Board of Supervisors depending on the purpose and use of the easements. All stormwater easements are to be dedicated to private property owners unless the easement is designed to carry stormwater away from stormwater infrastructure already owned by the Township.

3. RIPARIAN, STREAM, WATERCOURSE, DRAINAGE CHANNEL, POND, OR LAKE

This easement is intended to protect areas where the presence of wetlands adjacent to other waters of the US is likely to occur. (For this section the term "adjacent" means bordering, contiguous, or neighboring. per 33 CFR, part 328.3(a) as “waters of the United States”)

Where a subdivision and/or land development is traversed by a stream, watercourse, drainage channel, or has a pond or lake situated on the property, there shall be provided a minimum drainage easement fifty (50) feet in width (twenty-five (25) feet to each side of the stream, watercourse, and drainage channel) conforming substantially with its location for the purpose of protecting the stability of such watercourses. Any proposed land disturbance within these areas may require the necessary encroachment permits.

4. CONSERVATION (WETLANDS)

In all subdivision and land developments, a fifty (50) foot conservation easement shall be provided around all delineated wetland areas including ponds and lakes to ensure minimal disturbance and encroachment in these areas. Any proposed land disturbance within these areas may require the necessary encroachment permits.

5. PEDESTRIAN

Where necessary for access to private, public or common lands, a pedestrian easement shall be provided with a width of no less than ten (10) feet.

SECTION 519. DESIGN STANDARDS IN FLOODPLAIN

1. All subdivision and land development plans must adhere to the plating requirements found in Subsections 503.1.A and B and comply with the Miller Township Floodplain Management Ordinance prior to approval.

SECTION 520. UTILITIES

1. Telephone, electric, gas, TV cable and such other utilities shall be installed underground and shall be provided with easements to be dedicated for such utilities and in accordance with plans approved by the Miller Township Board of Supervisors and the applicable utility company.

2. Lots which abut existing easements or public rights-of-way where above ground utility lines have been previously installed may be supplied with electric and telephone service from those overhead lines, but service connections from the utilities' overhead lines shall be installed underground.

3. Where road widening and other conditions resulting from subdivision and land development necessitate replacement or relocation of overhead utility lines, new facilities shall be installed underground. Costs of any relocation of public utilities shall be the responsibility of the developer.

4. Underground installation of the utility distribution and service lines shall meet the prevailing standards and practices of the company providing the service and shall be completed prior to street paving and gutter, curbing and sidewalk installation

5. Where overhead lines are permitted as the exception, the placement and alignment of poles shall be designed to lessen their visual impact.

6. Underground Utility Notifications

   In accordance with the provisions of PA Act 38, as amended, the applicant shall contact all applicable utilities and accurately determine and show the location and depths of all underground utilities within the boundaries of the tract proposed for development and in the vicinity of any proposed off-site improvement, prior to excavation.

SECTION 521. STEEP SLOPE

1. The purpose of this steep slope section is to:

   - To promote the protection of public health, safety and welfare through the protection of steep sloped areas, which are subject to erosion when disturbed and which exacerbate stormwater run-off problems during and following construction.

   - To limit soil erosion, siltation of streams, and damage to private and public property.

   - To protect low-lying areas from flooding by mitigating impacts caused by grading of sloped areas, changes of ground cover, or erection of structures.

   - To maintain the ecological integrity of steeply sloped areas that could be adversely

affected by disturbances.

- To foster the continuing replenishment of groundwater resources and the maintenance of springs.

2. Areas of steep slope. For the purpose of this ordinance, areas of steep slope include all areas equal to or greater than fifteen (15) percent from the current slope data generated by the Perry County GIS Office.

3. If a subdivision or land development plan displays an impact to an area with steep slope, a stormwater management plan shall be required. This may extend to include Final Minor Plans.

4. If a subdivision or land development plan is proposed in an area with steep slope, a minimum ¼-acre of square area must be located on the property for the building site.

5. The steep slope areas are not required to be displayed on Final Lot Addition Plans.

SECTION 522. WETLANDS

1. Wetland areas are not limited to those areas delineated on wetland maps prepared by the U.S. Department of Interior, Fish and Wildlife Service. Any proposed encroachment (as identified in §518.4into the wetland shall include a copy of the permit or approval from the applicable State and Federal agencies.

2. If wetlands identified by the U.S. Department of Interior, Fish and Wildlife Service are present on the subject property, the applicant must determine if wetlands on the property will be impacted by proposed subdivision or land development activity. The applicant must also determine if any such wetland will be impacted off-site from the property. This determination shall be made in accordance with the current requirements of the Department of Environmental Protection (DEP) and the United States Army Corps of Engineers (USACOE).

3. Where hydric soils exist on a property in a location where proposed development activity may have an impact to such an area if wetlands were present, the applicant will need to have a wetlands trained biologist undertake a wetlands investigation for the purpose of delineating any wetland found within the area of the identified hydric soil.

4. All plans shall bear a note regarding the presence or non-existence of wetlands on the subject property and display these features.

SECTION 523. IMPORTANT NATURAL HABITATS

All applications for subdivision and land development where earth moving activity is proposed must be accompanied by a Pennsylvania Natural Diversity Inventory (PNDI) based on the limits

of the entire area where such activity will take place.

This section does not apply to lot additions or lots created as stand-alone non-building lots.

SECTION 524. TRAFFIC IMPACT STUDY

1. THRESHOLDS FOR REQUIRING A TRAFFIC IMPACT STUDY

At the time of any required plan submittal a traffic impact study is required for any of the following activities. The Applicant shall submit a traffic study and a written report, when:

A. Fifty (50) or more dwelling units are proposed.

B. More than twenty thousand (20, 000) square feet of total floor area of commercial space.

C. More than thirty thousand (30, 000) square feet of total floor area of office space.

D. Any truck terminal, or sixty thousand (60,000) square feet of total floor area of industrial space.

E. More than thirty thousand (30,000) square feet of total floor area of industrial space.

F. Any use or combination of uses that would generate results greater than fifteen hundred (1,500) trips per day.

2. In addition to the above, the Miller Township Board of Supervisors may require a Traffic Impact Study when, in their opinion, the following conditions exist:

A. Current traffic problems exist in the local area (E.g., high accident location, confusing intersection, congested intersection), or

B. The capability of the existing road system to handle increased traffic is questionable.

3. SCOPE OF TRAFFIC IMPACT STUDY

All Traffic Impact Studies shall meet the following requirements.

A. Costs. The full costs of completing the Traffic Impact Study and the review(s) by the Township Engineer shall be borne by the Applicant.

B. Study Area. Prior to initiation of the traffic study, the applicant's traffic engineer, or transportation planner shall meet with municipal officials, to establish the work area to be studied. This area is limited to streets and intersections within a maximum of one mile of the proposed project boundaries.

If no arterial or collector road as classified in the 2007 Perry County Comprehensive Plan exists within mile of the of the project boundaries, the study area shall be expanded to include those areas between the proposed project boundaries and the nearest collector or arterial road.

C. Joint Studies. Joint traffic studies between different Applicants are strongly encouraged. If a recent and relevant study is available, that information may be used if applicable as a basis for this required study.

D. Fees. In place of individual traffic studies, the Township Board of Supervisors may require that an Applicant provide a fee in lieu of a study. This fee shall only be used towards the costs of traffic studied conducted by the Township. Any such fee shall be established by resolution or ordinance of the Township Board of Supervisors.

E. Project Description. Any study shall include a description of the proposed development, its proposed access, and the surrounding street system. If a development is proposed to occur in phases, each phase shall be described and taken into account in the study. If the Applicant owns other lands within the study area, reasonable assumptions shall be made about how the land can be expected to be developed, and shall be taken into account.

F. Existing Traffic Conditions. The traffic volumes and service levels during the AM and PM peak hours shall be presented for all streets and traffic intersections in the study area that can be expected to be significantly impacted. Traffic volumes shall be based upon actual counts that occurred within the prior two years and not upon State estimates. The locations of all accidents reportable to the State Police within the study area during a recent two year period shall be noted.

G. Expected Traffic Generation. The study shall include an estimate of the number of trips expected to be generated by the use and any future stages during the AM and PM peak hours. Such estimates shall be based upon the latest published estimates of the Institute of Transportation Engineers, or its successor entity.

H. Projected Effects. The study shall take into account not only the land use(s) proposed by the applicant, but also other land uses and developments that have received building permits or preliminary subdivision approval. The study shall project AM. And PM. Peak hour traffic volumes and levels of service on impacted intersections and streets. If the traffic generation by the development would be more than thirty (30) percent greater during any hour other than the AM or PM peak hours on adjacent streets, the study shall analyze both the peak hours for the development and for adjacent streets. The study shall project what directions the traffic generated will head towards.

I. Levels of Service. The study shall use the description of the levels of service (A, B, C, D, and F) for streets and highways established by the U.S. Department of Transportation.

J. Signal Warrants. Heavily traveled intersections at entrances to the development and other major unsignalized intersections in the study area shall be studied to determine whether a traffic signal is warranted by Penn DOT criteria.

K. Clear Sight Triangle. Clear sight distances shall be provided for each point of ingress and egress. Said sight distance shall be in accordance with prevailing Penn DOT requirements for the desirable or safe sight distance as published in Chapter 441 of 67 Pa. Code. Safe stopping distance values shall be acceptable only when it is demonstrated to the satisfaction of the Township Engineer, it is impossible to achieve the desirable value by locating the access at any point within the property frontage boundary.

L. Needed Improvements. The study may take into account traffic improvements, which are clearly funded and will occur within the next two (2) years. The study shall include suggestions for how each congested or hazardous intersection in the study area should be improved to reduce the hazard or congestion, along with a rough estimate of the cost of the improvements.

M. Applicant's Response. The Applicant shall respond to the traffic study with proposals on what traffic improvements, right-of-way dedications, or commitments of financing for specific projects the Applicant proposes to commit to resolve the negative traffic impacts of the proposed development. Such improvements or financing may be staged relative to the stages of the development. The Applicant may also agree to commit towards the long-term support of a program to reduce peak hour traffic by private vehicles, through programs such as van pooling, support of mass transit, or staggered work hours, in place of certain structural improvements.

SECTION 525. SPACE BETWEEN BUILDINGS FOR LAND DEVELOPMENT

1. The spacing between buildings where land development is proposed shall be provided in accordance with the following schedule:

Table 5.10 Building Spacing Requirements

Positioning of Buildings	Minimum Allowable Distance Between Buildings Based Upon Building Orientation
Front to Front	70 feet
Front to Side	50 feet
Front to Rear	70 feet
Side to Rear	30 feet
Side to Side	30 feet
Rear to Rear	50 feet
Corner to Corner	20 feet

SECTION 526. EROSION AND SEDEMENTATION AND STORMWATER MANAGEMENT

Special precautions must be made with regards to erosion/sedimentation control and stormwater management which are related to subdivision and land development and construction activities. This Section outlines reasonable standards for erosion and sedimentation control and stormwater management in order to: (1) promote the general health, welfare and safety of residents in Township; (2) regulate the modification of the natural terrain and alteration of existing drainage from new subdivision and land developments in order to control erosion and sedimentation from soils, minimize the effect of pollution**,** and preserve stream channels; (3) provide design, construction and maintenance criteria for permanent on-site stormwater management facilities for the purpose of controlling stormwater, erosion and sedimentation pollution; (4) encourage recharge of groundwater and the preservation and restoration of the flood carrying capacity of streams; (5) and provide for the proper installation and maintenance of stormwater management facilities. This article does not imply that areas within or outside any identified flood-prone areas shall be free from flooding or flood damage.

1. EROSION AND SEDIMENTATION CONTROL PLAN

   A. General Requirements and Standards.

      1). In conjunction with the submission of a subdivision or land development plan and for any activities involving earth disturbance an Erosion and Sedimentation. Control (E&S) Plan must be prepared. For plans with less than 1 acre of earth disturbance, the County Conservation District will determine whether a review of the plan is necessary.

      2). If the earth disturbance is equal to or greater than 1 acre, the plan must be submitted to the County Conservation District for their approval in accordance with the requirements of the "Rules and Regulations", Chapter 102, EROSION CONTROL authorized under P. L. 1987, June 22, 1987. A copy of the E&S Plan must be provided as part of the plan set provided to the PCPC at the time of application.

      3). If the earth disturbance is equal to or greater than 1 acre will require a NPDES permit. A copy of the approval letter from the PADEP is required before final approval of the subdivision or land development plan.

      4). All associated PADEP Chapter 105 permits are required for approval final subdivision or land development plans.

2. STORMWATER MANAGEMENT PLAN

   In accordance with the intent and requirements of the Pennsylvania “Stormwater Management Act” (Act 167 of 1978, as amended) the stormwater management provisions contained in this section are intended to provide protection against uncontrolled stormwater runoff, and to insure that downstream property owners and watercourses are not adversely affected by increases in stormwater runoff resulting from subdivision and land development.

   Stormwater management plans are not required for subdivisions meant only for the

sale of lots. This includes properties for lot addition, non-building lots (agricultural/forest), or minor subdivisions with lots only displaying soil test sites. Such plans do not display any proposed features that would suggest construction activity will be immediately undertaken.

A. Municipal Stormwater Management Authority and Applicability

All subdivision and land development proposals shall meet the requirements of post construction stormwater management regulations in effect in the concerned municipality. In the absence of such regulations, the applicant shall have a stormwater management plan prepared in accordance with Section 527.2.B. below after it has been determined one of the following apply:

1). Land disturbance equal to or greater than 1 acre.

2). Installation of stormwater systems or appurtenances thereto;

3). Movement or alteration to an existing stormwater management system, included but not limited to, pipes, swales, basins, infiltration trenches, etc;

4.) Placement of fill, structures or pipes in the floodplain as designated on the official floodplain map, and as may be documented by other pertinent sources of floodplain information used by the Township. Proof of obtainment of required permit(s) will have to be submitted the final plan submission.

B. Content of the Stormwater Management Plan

The stormwater management plan shall be submitted in mapped tabular and digital form in accordance with the standards contained in Exhibits 5-3 through 5-6 and shall identify all proposed stormwater management facilities and supportive information outlined in this Section. In addition enacted Act 167 Stormwater Management Plans for watersheds provide standards in these plans.

Stormwater management data shall be prepared by a professional engineer or landscape architect registered in the Commonwealth of Pennsylvania to perform such duties. A certificate of accuracy must accompany stormwater management plans, and a signature and seal of the engineer or landscape architect responsible must appear on the plan. For subdivision and land development activities, the Stormwater Management Plan shall be included as part of the subdivision and land development plan submission(s) to the Municipality and shall include the following items:

1). A general statement describing the project, the date the project is expected to begin and end, a description of existing and proposed conditions; ownership and maintenance of facilities, and conclusions. Conclusions shall include a comparison of existing and proposed peak rates of runoff at all points where runoff leaves the applicant's property;

2). A 7 1/2 minute USGS topographic map, or equivalent, illustrating the project location and its total watershed(s), and additional maps as necessary, to clearly indicate the delineation of all drainage areas, both on site and off site, used in all computations for all drainage and stormwater management facilities;

3). Existing and finished contours, two (2) foot intervals, except in areas where slope is greater than twenty (20) percent, in which case the contour interval shall be five (5) feet;

4). Aerial extent of the project soils from Perry/ Cumberland Soil Survey with annotations for erodeable soils**,** hydric soils, and soils with hydric inclusions**;**

5). Boundary lines of the project area;

6). Existing drainage on project and adjoining properties such as floodplain, wetlands, streams, lakes, ponds and easements;

7). All calculations, assumptions, criteria, and references used in the design of the stormwater management facilities, the establishment of existing facilities capacities, and the pre- and post-development discharges;

8). All plans and profiles of the proposed stormwater management facilities, including horizontal and vertical location, size and type of material;

9). For all basins, a plotting or tabulation of the storage volumes and discharge curves with corresponding water surface elevations, inflow hydrographs, and outflow hydrographs, including all assumptions and calculation methodologies;

10).The guidelines for lot grading within the subdivision. This information shall identify the direction of stormwater runoff flow within each lot and the areas where stormwater runoff flows will be concentrated. This information shall be shown by topographical data including contours and spot elevations. Plans which assume future transfer of lot ownership shall show individual lot grading which maintains the proposed stormwater management plan, or a phasing plan shall be submitted with separate calculations which address interim stormwater management.

11).When stormwater management plans are for a portion of a larger project or include offsite flows through the subject property, a generalized stormwater management plan for the entire project shall be included in the Plan. This generalized plan shall demonstrate how the stormwater for the proposed section will relate to the entire development. If temporary facilities are required for construction of a section, such facilities shall be included in the submitted plans. In the event temporary measures cannot adequately handle the stormwater runoff, the main outfall shall be included as part of the construction of the proposed sections and detailed information regarding these facilities shall be included with the plan.

C. General Design Guidelines for Stormwater Management Facilities

1). The following design guidelines are presented as the minimum acceptable standards available at the time this Ordinance was adopted. New and innovative procedures are encouraged and shall be permitted on a case by case basis as approved by the Municipal Engineer or as outlined in local stormwater ordinance. Future stormwater ordinances, whether stand-alone or amended to the SALDO, shall be consistent with the applicable county, state and/or federal watershed management plan(s).

a). In the interest of (1) reducing the total area of impervious surface; (2) preserving existing features which are critical to stormwater management; and (3) reducing the concentration of stormwater flow, the designer should consider the best utilization of land for the least disturbance of natural features, resources and terrain.

b). Existing on-site natural and manmade stormwater management facilities shall be utilized when and where possible.

c). Stormwater shall not be transferred from one watershed to another, unless (1) the watersheds are sub-watersheds of a common watershed which join together within the perimeter of the property; (2) the effect of the transfer does not alter the peak discharge onto adjacent lands; or (3) easements from the affected landowner are provided.

d). Consideration shall be given to the relationship of the subject property to the drainage pattern of the watershed. A concentrated discharge of stormwater to an adjacent property shall be within an existing watercourse or enclosed in an easement or returned to a pre-development condition.

e). Innovative stormwater best management practices (BMPs) and recharge facilities may be proposed (e.g., rooftop storage, drywells, cisterns, recreation area ponding, diversion structures, porous pavements, holding tanks, infiltration systems, stream channel storage, in-line storage in storm sewers, and grading patterns). They shall be located, designed, and constructed in accordance with the latest technical guidance published by the Pennsylvania Department of Environmental Protection provided they are accompanied by detailed engineering plans and performance capabilities and supporting site specific soils, geology, runoff and groundwater and infiltration rate data to verify proposed designs. Additional guidance from other sources may be accepted at the discretion of the Municipal Engineer (a pre-application meeting is suggested).

D. Drainage Design and Construction Standards

1). Peak Flow

Permanent stormwater management facilities shall be designed and constructed to equal or reduce post construction runoff rates to preconstruction rates for the 2, 5, 10, 25, 50 and 100 year frequency runoff events.

In these cases, the Municipality may require the comparison, design, and storage of a greater storm event and/or the comparison of a greater post development storm event with a smaller pre-development storm event. In all cases undeveloped land within the project shall be considered good sod surface or natural forest, whichever best describes the pre-development condition.

Runoff coefficient for post development condition shall be based on the land uses listed in Exhibit 5-3. Where impervious cover exists, the Township Engineer, at the request of the Board of Supervisors, will determine the characteristics of the pre-developed site for appraising stormwater management requirements.

2). Additional Design Standards

a.). The design of stormwater management facilities (i.e. grass waterways, open channels, swales, ditches, etc.) and all other water carrying facilities shall be based upon a post twenty-five (25) year frequency storm event.

b) Stormwater management facilities that convey off-site stormwater through the site shall be designed to convey a post development fifty (50) year frequency storm event.

3). Rain Fall

Runoff calculations for the purposes of developing hydrographs shall be based on the Natural Resources Conservation Service Soil-Cover-Complex Method. The Rational Formula of Q=CIA shall be used for all conveyance calculations.

When the Soil-Cover-Complex Method is used, stormwater runoff calculations shall be based on the following 24-hour events:

Table 5.11 – 24 Hour Storm events and Rainfall Yield

Storm Event	Inches of Rainfall
2 years	2.69
5 years	3.58
10 years	4.27
25 years	5.33
50 years	6.28
100 years	7.38

SOURCE: National Oceanic Atmosphere Administration (NOAA), Atlas 14, Volume 2, (NOAA June 2004), Station 36-3704 (Harrisburg North).

When the Rational Method is used, appropriate values of rainfall intensity shall be from the latest edition of the Commonwealth of Pennsylvania, Department of Transportation Design Manual, Part 2, Highway Design, and Chapter 10 (Exhibit 5-4).

4). Time of Concentration

Times of concentration shall be based on NRCS Segmental Methodology utilizing the following design parameters:

a). Overland Flow

The maximum length for each reach of overland flow before concentrated swale flow develops is three hundred (300) feet, one hundred (100) feet for sheet flow and two hundred (200) feet for shallow concentrated flow. The appropriate value of Manning's "n" factor for the given conditions shall be used for determining the times of concentration.

b). Concentrated Flows

At points where overland flows concentrate in field depressions, swales, gutters, curbs, or pipe collection systems, the time of concentration between these design points shall be based on the Manning Equation and/ or acceptable engineering design standards as approved by the Municipal Engineer.

5). Any proposed direct stormwater discharge at the perimeter of the site shall not be beyond the capacity of any existing, immediately contiguous, stormwater management facility into which the discharge flows, regardless of pre-existing conditions.

6). Natural drainage ways shall be utilized to the maximum extent possible in carrying stormwater runoff, provided such use remains consistent with the purpose of this Article.

7). Detention and Retention Basins

a). Basins shall be designed to safely pass the peak discharge of a post-development one-hundred (100) year frequency storm event through an emergency spillway with one foot of freeboard between the maximum pool elevation and the top of the facility assuming that the outlet structure is 100% clogged. The spillway shall be no more than fifty (50) feet wide All outlets shall be combined in a manner which will not damage the integrity of the basin or the downstream drainage area.

b). Retention basins and/or detention basins, and water carrying facilities shall be stabilized promptly in accordance with current soil conservation

practices.

c). Retention basins and/or detention basins shall be designed and maintained to insure the design capacity.

d). Retention basins and/ or detention basins which are designed with earth fill dams shall incorporate the following minimum standards:

(1). Some dams for retention/detention may require a PADEP Dam Safety permit. (See PADEP Chapter 105 permit criteria)

(2). The maximum water depth shall not exceed six (6) feet in depth unless otherwise approved by the Board of Supervisors:

(3). The minimum top width of a dam breast shall be five (5) feet unless otherwise approved by the Board of Supervisors after consultation with the Township Engineer.

(4). The height of the dam shall not exceed eight (8) feet from the inside toe of slope, unless otherwise approved by the Board of Supervisors after consultation with the Township Engineer.

(5). The side slopes of the compacted earth fill shall not be steeper than three (3) horizontal to one (1) vertical (3:1).

(6). Basins without restricted access shall have impoundment areas with side slopes no steeper than five (5) horizontal to one (1) vertical. Basins with steeper side slopes shall be protected by fencing that will restrict access. Fencing at an adequate height to protect the public from entering any retention or detention basin shall be provided.

(7). A cutoff trench of impervious material shall be provided under all dams, with side slopes of three (3) horizontal to one (1) vertical or flatter. A dam with steeper sides shall be provided with a key trench.

(8). All pipes and culverts through dams shall be fitted with watertight joints and shall have properly spaced concrete cutoff collars or factory welded anti-seep collars.

(9). Minimum floor elevations for all structures that would be affected by a basin, other temporary impoundments, or open conveyance systems where ponding may occur shall be two (2) feet above the 100 year stormwater surface, if basement or underground facilities are proposed, detailed calculations addressing the effects of stormwater ponding on the structure and water-proofing and/or flood-proofing design information shall be submitted for approval.

(10). Trash racks are to be placed on detention basin structures and/or pipe inlets/outlets

8). Piping

a). The capacities of pipes shall be calculated by the Manning Equation or any other method of equal caliber which is acceptable to the Municipal Engineer.

b). Curved pipes, tee joints, elbows, and wyes are prohibited except for pipes with at least a 36-inch diameter or height. Minor horizontal deviations for smaller pipe shall be reviewed on a case by case basis.

c). All piping used in the storm drainage system shall be in accordance with PennDOT 408 specifications. A minimum pipe size of eighteen (18) inches in diameter shall be used in all roadway systems (public or private) proposed for construction in the Municipality. A minimum pipe size of fifteen (15) inches in diameter for on-site surface drainage requirements is permitted on private facilities which receive no off-site drainage. Pipes shall be designed so as to provide a minimum velocity of two and one-half (2 1/2) feet per second when flowing full. Arch pipe of equivalent cross-section area may be used in lieu of round pipe where cover or utility conflict conditions exist.

d). All storm drainage piping discharging to the ground surface shall be provided with either reinforced concrete headwalls and end sections or plastic and metal pipe end sections compatible with the pipe size involved in accordance with PADOT 408 and RC standards. A stabilized apron of adequate length shall be provided at all surface discharge points in order to minimize erosion. The apron shall extend to the crown of the pipe.

e). The following chart shall be used to determine the "n" factors for corrugated pipe:

Table 5.12 - N Factors for Corrugated Pipe

Pipe Diameter (Inches)	**Helical**		**Annular**	
	Capacity	Velocity	Capacity	Velocity
15 and 18	.017	.014	.025	.024
21 through 30	.021	.017	.026	.021
Larger	.026	.019	.026	.019

than 30				

f). The "n" factor for concrete or any other smooth pipe shall be .010 for velocity and .013 for capacity.

9). Swales and Channels

The capacities of swales and roadside gutters shall consider all possible hydraulic conditions. Swales shall meet the following requirements:

a). For grass swales and roadside gutters, two design considerations shall be met:

(1). The channel velocity and stability of the swale or gutter shall be based upon a low degree of retardance ("n" of 0.03);

(2). The channel capacity shall be based on a high degree of retardance (0.050).

b). The "n" factor to be used for paved or rip-rap swales or gutters shall be in accordance with the "Erosion and Sediment Pollution Control Program Manual," prepared by the PA DEP

c). Grass lined or planted channels shall have a minimum slope of seven-tenths (0.7) percent.

10). Inlets and Culverts

a). Inlets and culverts as street facilities shall be constructed in accordance with specifications set forth in the latest PennDOT Standards for Roadway Design and Construction or other details approved by the Township Engineer.

b). All inlets shall have weep holes covered with geotextile fabric placed at the appropriate elevations to completely drain the subgrade prior to placing the base course and surface course.

c). The maximum allowable spread of water on streets in a 25 year storm event is one-half (1/2) of a travel lane.

d). Stormwater management calculations shall include an inlet capacity analysis in order to verify spacing and to compute by-pass flow.

e). All inlets in paved areas shall have heavy duty bicycle safe grating. A note to this effect shall be added to the subdivision and land development plan.

f). All pipes entering or exiting inlets shall be cut flush with the inlet wall.

g). Inlets deeper than five (5) feet shall be provided with man hole type steps for access. A note to this effect shall be added to the subdivision and land development plan.

h). At the bottom of any inlet, additional concrete shall be added and adequately formed to provide for a smooth and efficient flow of water within the inlet. (Refer to the latest PennDOT Standards for Roadway Design and Construction.)

11). Manholes

a). Manholes, when proposed, shall be spaced not more than four hundred (400) feet apart. Additionally, manholes shall be placed at points of abrupt changes in the horizontal or vertical direction of storm sewers. Inlets may be substituted for manholes where they will serve a useful purpose.

b). Manholes shall be constructed in accordance with specifications set forth in the latest PennDOT, PennDOT Standards for Roadway Construction and Design.

12). Runoff Velocity

a). The maximum velocity of stormwater runoff shall be maintained at levels which result in a stable channel both during and after channel construction. The following are characteristics of a stable channel:

(1). It neither aggrades nor degrades beyond tolerable limits;

(2). The channel banks do not erode to the extent that the channel cross-section is changed appreciably;

(3). Excessive sediment bars do not develop;

(4). Excessive erosion does not occur around culverts and bridges or elsewhere;

(5). Gullies do not form or enlarge due to the entry of uncontrolled stormwater runoff.

(6). Where channel or swale bends occur, the computed velocities shall be multiplied by the following factor for the purpose of designing channel erosion protection:

1.5 When swale bend is 0 to 30 degrees;
1.75 When swale bend is 30 to 60 degrees;
2.00 When swale bend is 60 to 90 degrees;
2.50 When swale bend is 90 degrees or greater

Where the velocity of stormwater runoff exceeds the allowable velocity for soils, erosion protection must be provided. The methods of erosion protection proposed must be supported by the appropriate design information and references.

b). Grass lined or planted channels shall be considered stable if the calculated velocity does not exceed the allowable velocities shown below:

(1). Three (3) feet per second where only sparse vegetation can be established and maintained because of shade or soil conditions, and for all roadside swales.

(2). Four (4) feet per second where normal growing conditions exist and vegetation is to be established by seeding.

(3). Five (5) feet per second where a dense, vigorous sod can be quickly established or where water can be temporarily diverted during establishment of vegetation. Netting and mulch or other equivalent methods for establishing vegetation shall be used.

(4). Six (6) feet per second where there exists a well established sod or vegetation of good quality. These calculated grass-lined, or planted channel flows may be exceeded, if the designer can provide supportive design criteria as proof of erosion prevention.

(5). Calculated grass lined or planted channel flows may be exceeded if the designer can provide acceptable supportive design criteria as proof of erosion prevention. Where the velocity of stormwater runoff exceeds the allowable velocity, erosion protection must be provided. The method of erosion protection proposed must be supported by the appropriate design information and/ or references.

13). Compliance with PA Department of Environmental Protection (PA DEP) Chapter 105 Regulations

A PA DEP permit in accordance with Chapter 105 shall be required for any dams or obstructions or encroachment of regulated waters and wetlands of the Commonwealth, prior to the approval of the final plan. All areas of the Municipality shall be classified as suburban or urban (See PA DEP Section 105.141) for bridge and culvert designs. In the event any question or conflict arises between this article and the PA DEP Chapter 105 Regulations, the design criteria contained in the PA DEP regulations shall govern.

14). Compliance with Pennsylvania Department of Transportation (Penn DOT) Section 408 Specifications.

All materials, workmanship and methods of work shall comply with the Penn

DOT Form 408 specifications and/or the Municipal Standard Materials and Construction Specifications for Public Improvements, as accepted and commonly used by the Township.

E. Emergency Spillways

An emergency spillway shall be provided to safely pass the proposed peak 100-year storm with one foot of freeboard between the maximum pool elevation and the top of the facility assuming that the spillway is 100% clogged and there is no storage available.

3. Ownership and Maintenance of Erosion and Sedimentation Control and Stormwater Management Facilities

A. In cases where permanent erosion and/or stormwater management facilities are held as common facilities and/or owned by a home owners association, land owner, corporation, partnership, etc., it shall be the responsibility of that entity to maintain the facilities. In such cases, a legally binding agreement between the owner and the Municipality shall be prepared by the applicant describing the ownership arrangement and the provisions for maintaining all permanent stormwater management facilities. The agreement shall include provisions providing for the inspection of all facilities by the Municipality on a regular basis and after each major flood event, where facilities are critical to the public welfare. In addition, the applicant shall present to the Municipality a copy of restrictions and agreements with an affidavit stating that such restrictions and agreements shall be added to the deed of conveyance to each grantee to whom property of the development is to be conveyed. Agreements shall conform to the BMP Maintenance and Monitoring Agreement contained in Exhibit 5-10 and Appendix- 4.

B. Delinquency

In the event that the owner of stormwater management facilities shall, at any time after the construction or establishment of the facility, fail to adhere to the ownership and maintenance agreement and keep any said facility or facilities in reasonable working order and condition in accordance with established standards, guidelines and agreements, the Board of Supervisors may serve written notice upon the owner, Association, Condominium, Corporation, Partnership, etc. in accordance with the procedures set forth in Article 5, Section 517 of this Ordinance.

C. In cases where permanent erosion and stormwater management facilities, rights-of-way, and access easements to these facilities are dedicated to the Municipality and accepted by the Board of Supervisors, it shall be the Township's responsibility to maintain these facilities.

4. Municipal Liability

The degree of stormwater management sought by the provisions of this Section is considered reasonable for regulatory purposes. This Section shall not create liability on the part of the Township, any appointed or elected official of the Township, the County

Conservation District, or any officer, engineer or employee thereof for any erosion, sedimentation pollution or flood damages that may result from reliance on this article or any administrative decision lawfully made thereunder.

Exhibit 5.1 - Rainfall Coefficient "C" for Rational Formula and "CN" Range

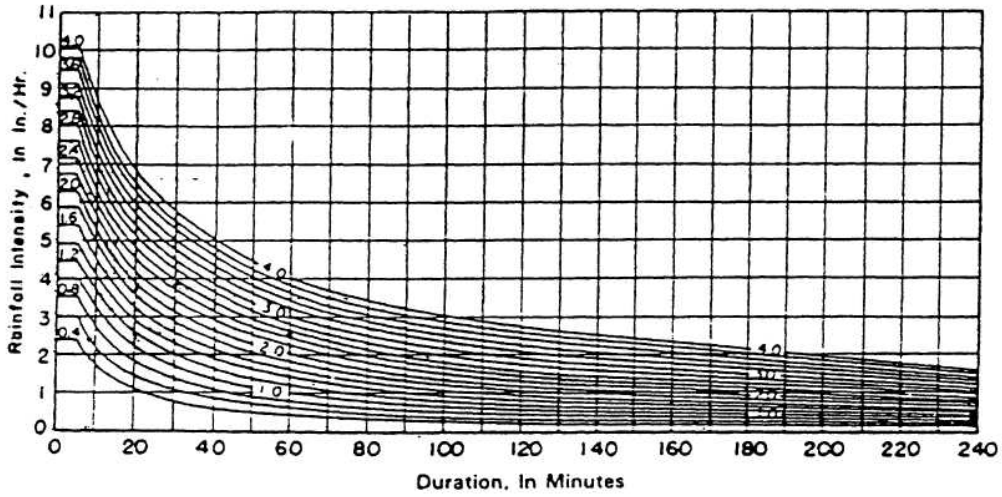
Land Use	C Min.	C Max.	Approx. CN Range	Percent Impervious
Construction Sites <30% slope				
Bare packed soil, smooth	.30	.60	60-90	0
Bare packed soil, rough	.20	.50	66-77	0
Wooded Areas				
Heavy Ground Litter	.10	.20	55-70	0
Light Ground Litter	.15	.30	60-73	0
Steep Rocky Slopes	.20	.50	66-77	0
Reverting Farmland/Meadow				
100% Vegetative Cover	.10	.20	48-65	0
80% Vegetative Cover	.15	.30	56-70	0
50% Vegetative Cover	.25	.60	60-80	0
Open Grass-Covered Areas				
80%+ Covering	.10	.20	61-74	1
50-80% Covering	.20	.50	69-79	1
Rural Areas				
1 home per 10 acres	.15	.30	74-82	5
Residential				
1 Acre Lots	.15	.40	68-79	20
½ Acre Lots	.25	.50	70-80	25
¼ Acre Lots	.40	.60	75-83	36
Multiunits (attached)	.60	.75	85-90	65
City Business Area				
75% Area Covered	.50	.70	88-91	72
Dense Development	.70	.95	92-94	85
Industrial Area				
Light to Medium Density	.50	.80	88-91	70
High Density	.60	.95	92-94	70
Streets and Parking Lots				
Asphalt	.70	.95	98	95
Concrete	.80	.95	98	95

NOTE: The C values provided in Table 4.2 have been equated to approximate CN values (Hydrologic soil groups B & C) and percent imperviousness through use of the Rossmiller C factor nomograph. If required, a specific C value may be developed by use of Rossmiller's nomograph. In most cases, however, use of Exhibit 5.1 will provide a sufficiently accurate "C" value. This table should not be used to determine CN numbers for the TR – 55 Method.

Exhibit 5.2 - Rainfall Intensity Computation

The following figure contains generalized rainfall intensity-duration curves to be used especially for storm durations less than 60 minutes. A one-hour storm must be supplied from the previously described rainfall estimating procedure, and entered at duration 60 minutes in the following Figure. From the intersection of the 1 -hour storm intensity and the 60-minute ordinate the user follows the path of the nearest curve to the duration of the design storm, then moves horizontally to the y-axis to read the corresponding storm intensity in inches/hour.

Example: Given a 1 -hour storm of 2.5 in./hr., find the 30-minute intensity for the same storm recurrence frequency. Start at 60-minute duration and 2.5 in./hr. intensity, move along curves to 30 minutes, and read the 30-minute intensity as 3.9 in./hr.



Standard rainfall intensity-duration curves or standard curves.

NOTES: Curve numbers correspond to 1 -*h (.* values of rainfall or supply indicated by respective curves; all points on the same curve are assumed to have the same average frequency of occurrence. From *Engineering Manual by* Corps of Engineers. U.S. Army.

•Reference: Research report "Recommended Hydrologic Procedures for Computing Urban Runoff from Small Watersheds in Pennsylvania". Penn State University. January 1982.

Exhibit 5.3 - Time of Concentration Nomograph (Rational Method)

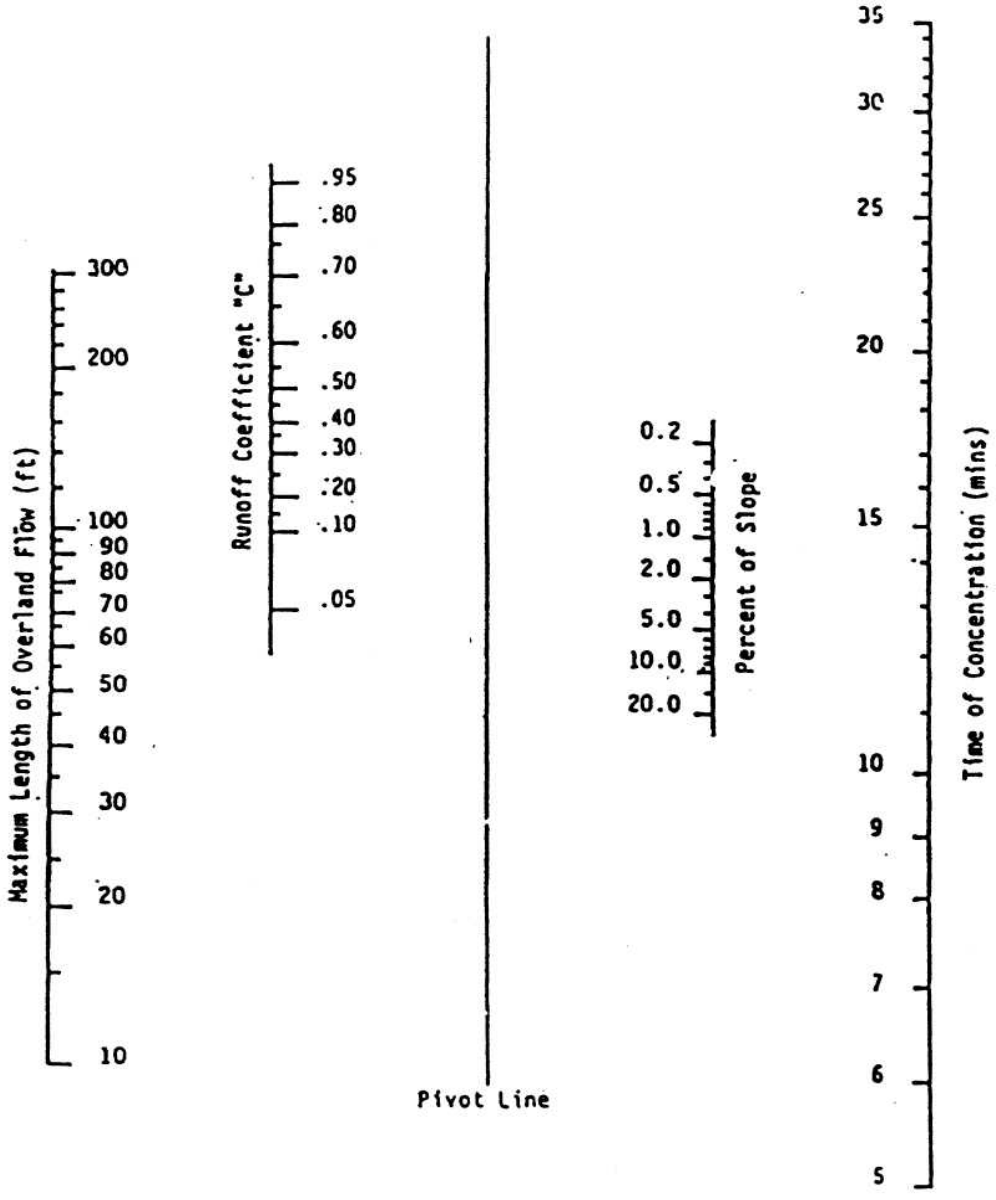


Exhibit 5.4 - Runoff Coefficients for the Rational Formula versus Hydrologic Soil Group (A, B, C, D) and Slope Range

	A			B			C			D		
Land Use	**0-2%**	**2-6%**	**6%+**	**0-2%**	**2-6%**	**6%+**	**0-2%**	**2-6%**	**6%+**	**0-2%**	**2-6%**	**6%+**
a Cultivated land	0.08	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.31
b	0.15	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.41
Pasture	0.12	0.20	0.30	0.18	0.28	0.37	0.24	0.34	0.44	0.30	0.40	0.50
	0.15	0.25	0.37	0.23	0.34	0.45	0.30	0.42	0.52	0.37	0.50	0.62
Meadow	0.10	0.16	0.25	0.14	0.22	0.30	0.20	0.28	0.36	0.24	0.30	0.40
	0.14	0.22	0.30	0.20	0.28	0.37	0.26	0.35	0.44	0.30	0.40	0.50
Forest	0.05	0.08	0.11	0.08	0.11	0.14	0.10	0.13	0.16	0.12	0.16	0.20
	0.08	0.11	0.14	0.10	0.14	0.18	0.12	0.16	0.20	0.15	0.20	0.25
Residential lot	0.25	0.28	0.31	0.27	0.30	0.35	0.30	0.33	0.38	0.33	0.36	0.42
- 1/8 acre	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.54
Residential lot	0.22	0.26	0.29	0.24	0.29	0.33	0.27	0.31	0.36	0.30	0.34	0.40
- 1/4 acre	0.30	0.34	0.37	0.33	0.37	0.42	0.36	0.40	0.47	0.38	0.42	0.52
Residential lot	0.19	0.23	0.26	0.22	0.26	0.30	0.25	0.29	0.34	0.28	0.32	0.39
- 1/3 acre	0.28	0.32	0.35	0.30	0.35	0.39	0.33	0.38	0.45	0.36	0.40	0.50
Residential lot	0.16	0.20	0.24	0.19	0.23	0.28	0.22	0.27	0.32	0.26	0.30	0.37
- 1/2 acre	0.25	0.29	0.32	0.28	0.32	0.36	0.31	0.35	0.42	0.34	0.38	0.48
Residential lot	0.14	0.19	0.22	0.17	0.21	0.26	0.20	0.25	0.31	0.24	0.29	0.35
- 1 acre	0.22	0.26	0.29	0.24	0.28	0.34	0.28	0.32	0.40	0.31	0.35	0.46
Industrial	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.69	0.69	0.69	0.69	0.70
	0.85	0.85	0.86	0.85	0.86	0.86	0.86	0.86	0.87	0.86	0.86	0.88
Commercial	0.71	0.71	0.72	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	0.88	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.90
Streets	0.70	0.71	0.72	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.78
	0.76	0.77	0.79	0.80	0.82	0.84	0.84	0.85	0.89	0.89	0.91	0.95
Open space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.16	0.21	0.28
	0.11	0.16	0.20	0.14	0.19	0.26	0.18	0.23	0.32	0.22	0.27	0.39
Parking	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97

a. Runoff coefficients for storm recurrence intervals less than 25 years.
b. Runoff coefficients for storm recurrence intervals of 25 years or longer.

Exhibit 5.5 - PA Region 4 IDF Values (Source PennDOT)

Duration (min)	Rainfall Intensity (in/hr)						
	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
1	5.21	5.80	6.39	6.90	7.60	8.20	9.00
2	4.66	5.27	5.92	6.43	7.10	7.81	8.61
3	4.24	4.83	5.52	6.04	6.68	7.37	8.15
4	3.91	4.48	5.18	5.70	6.31	6.97	7.71
5	3.65	4.19	4.89	5.41	5.99	6.61	7.32
6	3.42	3.94	4.63	5.15	5.71	6.29	6.97
7	3.23	3.73	4.40	4.92	5.46	6.00	6.66
8	3.06	3.55	4.19	4.72	5.23	5.75	6.38
9	2.92	3.38	4.01	4.53	5.02	5.52	6.13
10	2.79	3.24	3.84	4.36	4.84	5.31	5.90
11	2.67	3.11	3.69	4.21	4.67	5.12	5.69
12	2.56	2.99	3.56	4.07	4.51	4.95	5.50
13	2.47	2.89	3.43	3.94	4.36	4.79	5.33
14	2.38	2.79	3.32	3.81	4.23	4.64	5.16
15	2.30	2.70	3.21	3.70	4.10	4.51	5.01
16	2.23	2.62	3.11	3.60	3.99	4.38	4.87
17	2.16	2.54	3.02	3.50	3.88	4.26	4.74
18	2.09	2.47	2.94	3.41	3.77	4.15	4.62
19	2.03	2.40	2.86	3.32	3.68	4.05	4.50
20	1.98	2.34	2.78	3.24	3.59	3.95	4.39
21	1.93	2.28	2.71	3.16	3.50	3.86	4.29
22	1.88	2.22	2.65	3.08	3.42	3.77	4.19
23	1.83	2.17	2.59	3.01	3.34	3.69	4.10
24	1.79	2.12	2.53	2.95	3.27	3.61	4.02
25	1.74	2.08	2.47	2.89	3.20	3.53	3.93
26	1.71	2.03	2.42	2.83	3.13	3.46	3.85
27	1.67	1.99	2.37	2.77	3.07	3.40	3.78
28	1.63	1.95	2.32	2.71	3.01	3.33	3.71
29	1.60	1.91	2.28	2.66	2.95	3.27	3.64
30	1.57	1.87	2.24	2.61	2.90	3.21	3.58
31	1.54	1.84	2.20	2.56	2.85	3.16	3.51
32	1.51	1.80	2.16	2.52	2.80	3.10	3.45
33	1.48	1.77	2.12	2.47	2.75	3.05	3.40
34	1.45	1.74	2.08	2.43	2.70	3.00	3.34
35	1.43	1.71	2.05	2.39	2.66	2.95	3.29
36	1.40	1.68	2.02	2.35	2.61	2.91	3.24
37	1.38	1.66	1.98	2.31	2.57	2.86	3.19
38	1.36	1.63	1.95	2.27	2.53	2.82	3.14
39	1.33	1.60	1.92	2.24	2.49	2.78	3.10
40	1.31	1.58	1.90	2.20	2.45	2.74	3.05
41	1.29	1.56	1.87	2.17	2.42	2.70	3.01
42	1.27	1.53	1.84	2.14	2.38	2.66	2.97
43	1.25	1.51	1.82	2.11	2.35	2.63	2.93
44	1.23	1.49	1.79	2.08	2.32	2.59	2.89
45	1.22	1.47	1.77	2.05	2.29	2.56	2.85
46	1.20	1.45	1.74	2.02	2.25	2.53	2.82
47	1.18	1.43	1.72	1.99	2.23	2.50	2.78
48	1.17	1.41	1.70	1.96	2.20	2.46	2.75
49	1.15	1.39	1.68	1.94	2.17	2.44	2.72
50	1.14	1.37	1.66	1.91	2.14	2.41	2.69
51	1.12	1.36	1.64	1.89	2.12	2.38	2.65
52	1.11	1.34	1.62	1.86	2.09	2.35	2.62
53	1.09	1.32	1.60	1.84	2.06	2.32	2.60
54	1.08	1.31	1.58	1.82	2.04	2.30	2.57
55	1.07	1.29	1.56	1.80	2.02	2.27	2.54
56	1.05	1.28	1.55	1.78	1.99	2.25	2.51
57	1.04	1.26	1.53	1.75	1.97	2.23	2.49
58	1.03	1.25	1.51	1.73	1.95	2.20	2.46
59	1.02	1.23	1.50	1.72	1.93	2.18	2.44
60	1.01	1.22	1.48	1.70	1.91	2.16	2.41
75	0.86	1.05	1.28	1.46	1.65	1.88	2.11
90	0.76	0.92	1.12	1.30	1.48	1.68	1.89
120	0.62	0.75	0.92	1.07	1.23	1.40	1.59
180	0.46	0.57	0.70	0.81	0.94	1.08	1.23
240	0.38	0.46	0.57	0.67	0.78	0.90	1.03
360	0.28	0.34	0.42	0.51	0.60	0.69	0.79
480	0.23	0.28	0.34	0.42	0.50	0.57	0.65
720	0.17	0.21	0.25	0.32	0.38	0.43	0.50
1080	0.12	0.15	0.19	0.24	0.29	0.33	0.38
1440	0.10	0.12	0.15	0.19	0.24	0.27	0.31

Exhibit 5.6 – Sample Stormwater Management Report

1. **Table of Contents**

2. **Stormwater Management Summary**

3. **Project Narrative**

4. **Pre-Development Hydrograph Calculations**

   A. Weighted CN Calculations

   B. Tc Calculations

   C. Hydrographs – 2, 10, 25, 50 and 100 Year Frequencies

5. **Post-Development Hydrograph Calculations** (for each Drainage Area)

   A. Design Point 1 (Drainage Area 1)
      1). Weighted CN Calculations
      2). Tc Calculations
      3). Hydrographs – 1, 2, 10, 25, 50 and 100 Year Frequencies

   B. Design Point 2 (Drainage Area 2)
      1). Weighted CN Calculations
      2). Tc Calculations
      3). Hydrographs – 1, 2, 10, 25, 50 and 100 Year Frequencies

6. **Post-Development Hydrograph Combinations – Drainage Area 1 and 2**

7. **Detention Basin Calculations**

   A. Basin Characteristics
      1). Basin Stage Storage – Elevation Data
      2). Outlet Structure Configuration
         a).Schematic Details: Orifice, Elevation, Cross-Section, Trash Rack, Anti-Seep Collar, Clay Core
      3). Basin Routing Table

   B. Outflow Hydrographs – 1, 2, 10, 25, 50 and 100 year Frequencies

   C. Outfall Protection/Level Spreader Design Calculations

   D. Emergency Spillway Calculations
      1). Orifice Blocked Outflow Hydrograph – 100 Year Frequency

2). Spillway Sizing – Weir Equation

E. Anti-Seep Collar Calculations

8. Extended Detention of 1 Year Frequency Hydrograph Calculations

9. Basin Empty Time Analysis – 100 Year Storm

10. Best Management Practices (BMP) Calculations and Details

A. Water Quality
1). Volume Calculations
2). BMP Design and Application

B. Groundwater Recharge
1). Geologic Analysis
2). Volume Calculations – 2-Year 24 Hour rainfall
3). BMP Design and Application

11. Conveyance Calculations

A. Pipe Design Calculations
1). Weighted CN Calculations
2). Tc Calculations
3). Peak Flow or Hydrographs, 10, 25 and 100 Year Frequencies
4). Hydraulic Grade Line Calculations, using 10, 25 and 100 Year Frequency Peak Flows
5). Pipe Outlet Lining Calculations – rip-rap or matting

B. Culvert Design Calculations

C. Swale Design Calculations
1). Weighted CN Calculations
2). Tc Calculations
3). Peak Flow or Hydrographs, using 10, 25 and 100 Year Frequencies
4). Capacity Calculations – permanent/lined condition
5). Stability Calculations – temporary and permanent conditions

Appendix A: Pre-Development Drainage Area Map, including Tc information
Appendix B: Post-Development Drainage Area Map, including Tc information
Appendix C: Off Site Drainage Area Map, including Tc information
Appendix D: Inlet Drainage Area Map
Appendix E: SCS Runoff Curve Numbers
Appendix F: Regional Rainfall Curve Chart
Appendix G: C Values for Rational Method
Appendix H: Hydrologic Soil Group Listing

Assumptions:

1. If off-site runoff drains to design point, include calculations under Pre-Development Hydrograph Calculations.

2. If an existing detention facility discharges to the site, the hydrograph analysis to document discharge rate will be added to Pre-Development Hydrograph Calculations using the same format as Post-Development.

3. Hydraulic Grade Line Calculations use a program that considers inlet efficiency and bypass, and ponding over inlets (depth at curb line).

Exhibit 5.7 – Sample Stormwater Management Summary

Project: _____ **Date:** _____

Drainage Area: ID Number_____ **Acres**_____ **Release Rate:** _____
Note: Use a separate sheet for each Drainage Area.

	Design Year Storm Event					
Discharge Rates: cubic feet per second (cfs)	**2**	**5**	**10**	**25**	**50**	**100**
Pre-development discharge						
Allowable post-development discharge (per release rate)						
Post-development discharge to SWM facility						
Post-development bypass						
Post-development discharge from SWM facility						
Post-development combined routed discharge						

WATER QUALITY REQUIREMENTS

Computed Water Quality Volume: _____ cubic feet

Proposed BMP(s) to meet the WQ requirements: _____

GROUNDWATER RECHARGE REQUIREMENTS

Computed Groundwater Recharge Volume: _____ cubic feet

Proposed BMP(s) to meet GR requirements:
_____

GENERAL PROTECTION REQUIREMENTS

Dewatering Time: 1-year storm event: _____ hours

SWM Facility Maximum Capacity: _____ hours

Exhibit 5.8 – Sample Operation and Maintenance Plan for Stormwater BMPs

A. INSPECTIONS

1. Stormwater facilities and permanent BMPs must be inspected, at a minimum on an annual basis, or as requested by the Township, in accordance with this O & M Plan. The property owner has two options:

   i. Employing a qualified registered professional to conduct the inspections and prepare reports; or

   ii. Entering into an agreement with the Municipality for the Municipality to conduct the inspections and prepare reports. This can be included in the Stormwater Facilities and Best Management Practices (BMP) Maintenance and Monitoring Agreement (M & M Agreement).

2. If Option i. is chosen, the entity conducting the inspection shall be required to submit a report to the Municipality within thirty days following completion of the inspection. The report shall document the condition of the facilities and recommend needed repairs. Recommended repairs and other corrective actions shall be implemented by the property owner within thirty days of the report date.

3. If Option ii. is chosen, the property owner shall be responsible for reimbursing the Township for the costs involved in accordance with the M & M Agreement.

4. Inspections of open basins shall include but not be limited to:

   i. Structural integrity and operation of outlet structures and appurtenances.

   ii. Stability of embankments and other soil areas.

   iii. Integrity, condition and recharge capacity of vegetation.

   iv. Collection, storage and release of stormwater in accordance with the facility design.

   v. Sediment accumulation.

   vi. Safety.

5. Inspections of subsurface storage facilities shall include but not be limited to:

   i. Structural integrity and operation of outlet structures and appurtenances.

ii. Stability of soil over and adjacent to the facility.

iii. Collection, storage and release of stormwater in accordance with the facility design.

iv. Sediment accumulation.

v. Safety.

B. MAINTENANCE

1. Vegetation in and adjacent to basins shall be maintained in accordance with the approved plan, applicable watershed management plans and in accordance with Township Ordinances.

2. Debris shall be removed from basins on a quarterly basis. Floatable debris that may impact operation of the outlet structure shall be removed immediately.

3. Groundwater Recharge and Water Quality BMPs shall be observed quarterly during runoff events to insure operation as designed. BMPs shall be cleaned as required to insure continued operation as designed.

4. Maintenance and observation activities shall be documented in the Inspection Report.