

Part 4
Design Standards

§401. Application and Interpretation of Chapter.

1. The land subdivision principles and standards outlined in this Chapter shall be applied by the Planning Commission and the Township Council and other appropriate local officials in determining the adequacy of all plans for proposed subdivisions and land developments.

2. The standards outlined in this Chapter shall be considered minimum standards for the promotion of the public health, safety, morals and general welfare. These design standards may be altered by the Township Council for the purpose of achieving economy and ingenuity in design in accordance with modern and evolving principles of site planning and development upon presentation of evidence that the intent of such standards and requirements shall be substantially achieved. (Ord. 1-1993, 2/4/1993)

§402. Land Hazards. Land subject to hazards to life, health or property, such as quarry land, open ditches, swamps, etc., shall not be subdivided for residential purposes until all such hazards have been eliminated or unless adequate safeguards against such hazards are provided by the subdivision plan as approved by the Township.

(Ord. 1-1993, 2/4/1993)

§403. General Standards.

1. Land shall be suited for the purpose for which it is to be used. Unsafe or hazardous conditions such as open quarries, unconsolidated fill, or flood-prone areas shall not be subdivided or developed unless the subdivision or land development plan provides for adequate safeguards which are approved by the Planning Commission and the Township Council.

2. Consideration shall be given to applicable provisions of the Township comprehensive plan and the Delaware County land use plan emphasizing future school sites, recreation sites, water supply and sewage treatment systems, highway alignment and other public facilities. However, consideration must be given to the need for the facilities and utilities mentioned above whether or not they are proposed as part of a comprehensive plan.

3. The development of a proposed subdivision or land development shall be coordinated with adjacent existing development so that the area, as a whole, may develop harmoniously.

(Ord. 1-1993, 2/4/1993)

§404. Sanitary Sewage Disposal.

1. Acceptable Types of Systems. The developer shall provide the most effective type of sanitary sewage disposal consistent with the natural features, location, and proposed development of the site. The following types of sanitary sewage disposal are listed in order of preference:

A. Connection to a public sanitary sewage collection and a treatment system.

B. Provision by the developer for a community sanitary sewage disposal system or treatment facility capable of being connected to a public system in accordance with the requirements of Pennsylvania Department of Environmental Resources.

C. Capped sewers with temporary, approved on-lot facilities.

D. On-lot sewage disposal systems.

2. Connection to a Public Sewerage System. Connection to a public sanitary sewer system shall be required where such a system can be provided to adequately fulfill the sewage disposal needs of the proposed subdivision or land development tract and where the Township Zoning Ordinance [Chapter 27] prohibits utilization of alternative systems.

3. Installation of Capped Sewers.

A. For any new development where a public sanitary sewer system is not yet accessible to the site but a final design has been prepared and a Pennsylvania Department of Environmental Resources permit has been secured to provide an extension of the public sewer system to the subdivision site within a five (5)-year period, the developer shall install sewer lines, including lateral connections, as may be necessary to provide adequate service to each lot when connection with the sewer system is made.

B. The sewer lines shall be suitably capped at the limits of the subdivision or land development, and the laterals shall be capped at the street right-of-way lines. When capped sewers are provided, on-site disposal facilities shall also be provided. Design of the capped system shall be in accordance with the standards of the Pennsylvania Department of Environmental Resources and subject to the approval of the Township Engineer and the local Sewage Enforcement Officer.

C. If the proposed streets are to remain part of a property, an easement shall be provided across this private property for later construction and maintenance of sewers. Any deed of conveyance given for a property in a case where an easement for future construction of sanitary sewers is provided on the record plan shall contain a legal description of the easement and a provision that the owner is liable for the cost of the sewer when constructed.

4. Provision of Community Sewage System.

A. Where a public sanitary sewer system cannot be provided to the proposed subdivision or land development tract and is not planned for extension to this tract or where on-lot sewerage is prohibited by the Township Zoning Ordinance [Chapter 27] or clearly unfeasible in engineering or environmental terms, the developer may provide a community sewerage system or treatment facility. In this case, the Planning Commission may recommend that a community sewerage system feasibility report be required.

B. When such a report is required, it must be prepared by a qualified registered engineer and submitted to the Township Council, the Planning Commission, and the Pennsylvania Department of Environmental Resources.

5. Provision of On-Lot Sewage Disposal. In subdivisions and land developments where connection to either a public sewerage system or a community sanitary sewerage system is not required, sewage disposal facilities shall be provided on individual lots. The physical features of the tract on which on-lot disposal is provided and the on-lot disposal system design, including the size of the septic tanks, the tile absorption fields, or other secondary treatment devices, shall meet the standards established by the Pennsylvania Department of Environmental Resources for on-lot sewage disposal systems.

(Ord. 1-1993, 2/4/1993)

§405. Water Supply.

1. Water lines shall be installed to serve all land developments and each lot in all subdivisions where such service does not presently exist. The installation, location and specifications for the construction of water lines shall comply with all applicable regulations of the water supplier and the Township. Easements shall be provided for the water lines as needed.

2. Prior to approval by the Township Council, the Township Engineer shall approve the necessary documentation that the supply of water is sufficient in amount and pressure for domestic, commercial or industrial use as well as for emergency purposes.

3. The proposed water system must be reviewed by the responsible local water authority and found to be acceptable.

4. Fire hydrants must be installed as an integral part of any water supply system and placed no more than six hundred (600) feet apart.

5. The location, need, design and related features of fire hydrants shall be reviewed by the Township Fire Marshall for conformance with applicable existing laws and regulations.

(Ord. 1-1993, 2/4/1993)

§406. Relation of Sewer to Water Installations.

1. Water Supply Interconnections. There shall be no physical connection between a public or private potable water supply system and a sewer which will permit the passage of any sewage or polluted water into the potable water supply.

2. Sewer and Water Mains. A minimum horizontal distance of ten (10) feet shall be maintained between parallel water and sewer lines unless shelving is used. If shelving is used, the water lines shall be at the higher elevation of the trench. At points where sewers cross water mains at a vertical distance of less than two (2) feet, special treatment of the sewer pipes shall be required to preclude contamination of potable water. In no case shall the vertical distance be less than the Department of Environmental Resources requirements.

3. On-Lot Water Supply and Sewerage Facilities. On-lot sewage disposal systems shall be kept removed from water supply wells or other water supply sources in accordance with the latest Department of Environ-

mental Resources' requirements. A lot to accommodate both on-lot sewage disposal and on-lot water supply shall be no smaller than thirty thousand (30,000) square feet.

(Ord. 1-1993, 2/4/1993)

§407. Utility Lines and Easements.

1. General Regulations.

A. Where practicable, all utilities, with the exception of on-site laterals, shall be located in public rights-of-way. Where this is not possible, utility easements shall be located on or adjacent to rear or side lot lines to the fullest extent possible.

B. In general, the required pipe or other improvement shall be located in the center of the easement.

C. Prior to determining the location of easements, the Planning Commission shall require the developer or subdivider to coordinate his plans with those of the local public utilities in order to assure proper location of easements for the installation of the required service.

D. No permanent structures or trees shall be placed within such easements.

E. Where practicable, utility lines shall share a common utility easement.

F. All electric, telephone service, and cable television transmission lines in new residential developments with (5) or more dwellings shall be placed underground and installed in accordance with the prevailing standards of the utility company providing such services.

2. Width of Sanitary and Storm Sewers. Sanitary or storm sewer easements shall have a minimum width of twenty-five (25) feet.

3. Petroleum and Natural Gas Transmission Lines.

A. No company intending to install any petroleum, petroleum product or natural gas transmission lines shall be allowed to construct the lines on less than a fifty (50) feet right-of-way. Such lines are to be installed in the center of the right-of-way and shall comply with the applicable standards imposed by State and Federal laws and regulations.

B. There shall be a minimum distance of thirty-five (35) feet, measured from the right-of-way line, between any proposed dwelling unit or other structure and the right-of-way line of any petroleum, petroleum products or natural gas transmission line which traverses the subdivision or land development.

(Ord. 1-1993, 2/4/1993)

§408. Stormwater Management.

1. Overall Considerations. In all subdivisions and land developments proposed, storm drainage facilities shall be provided in order to:

A. Permit unimpeded flow of natural watercourses.

B. Insure adequate drainage of all low points along the lines of streets.

C. Intercept stormwater runoff along streets at intervals related to the extent and grade of the area drained.

D. Provided positive drainage away from on-site sewage disposal.

E. Remove surface water from the bottom of vertical grades, lead water from springs, and avoid excessive use of cross-gutters at street intersections and elsewhere.

2. Stormwater Management Plan. Each subdivision and/or land development shall provide:

A. Calculations of runoff concentration and the proposed stormwater management system.

B. Complete drainage systems for the subdivision or land development.

C. Approval by the Pennsylvania Department of Transportation when drainage structures are to be located on State highway rights-of-way or connection is made to the existing State highway system.

3. General Regulations.

A. All storm drains and drainage facilities such as pipes, gutters, inlets, catch basins, culverts and other proposed structures necessary for the collection, retention and conveyance of stormwater runoff shall be delineated, depicted and otherwise noted at the time of preliminary plan submission as provided in this Chapter.

B. Suitable storm drainage facilities shall be provided in order to maintain or lessen the existing rate of flow from the tract without damage to land or structures within and adjacent to the subdivision or land development.

C. Storm sewers, culverts, bridges and related drainage installations shall be provided:

(1) To permit unimpeded flow of natural watercourses. Such flow may be redirected as required, subject to the approval of the Pennsylvania Department of Environmental Resources, Army Corps of Engineers or any other applicable government agency.

(2) To ensure adequate drainage of all low points as may be related to streets.

(3) To intercept stormwater runoff along streets at intervals reasonably related to the extent and grade of the area drained, to prevent flow of stormwater across intersections, and to prevent the flooding of intersections during the design storm.

(4) To ensure adequate and unimpeded flow of stormwater under driveways in, near, or across natural watercourses or drainage swales. Properly sized pipes or other conduits shall be provided as necessary.

(5) To prevent excessive flow on or across streets, sidewalks, drives, parking areas, and any other paved surface or access way.

(6) To lead stormwater away from springs.

D. The stormwater management plan for each subdivision and/or land development shall take into account and provide for upstream areas within the entire watershed in computing discharge, sizing of pipes, inlets and other structures. The runoff from any proposed development shall be subject to evaluation which includes the anticipated runoff from other existing or proposed development within the same watershed.

E. All natural streams, channels, swales, drainage systems and/or areas of concentration of surface water shall be maintained in their existing condition unless alteration is approved by the Township and all other required governmental agencies. In any event, all encroachment activities and drainage facilities for drainage areas in excess of one-half ($\frac{1}{2}$) square mile or three hundred twenty (320) acres shall conform to the most current requirements of, and be approved by, the Pennsylvania Department of Environmental Resources, Division of Dams and Encroachments.

F. Any drainage facility crossing a State road shall conform to all applicable PennDOT design standards.

G. Man-made structures shall be kept to a minimum and bridges, culverts, or rip-rap shall be constructed to maintain the natural characteristics of the stream and shall meet the approval of the Township.

H. Retention/detention basins shall be designed to utilize the natural contours of the land whenever possible. When such design is impracticable, the construction of basins shall utilize slopes as shallow as possible to blend the structure into the terrain.

I. Any subdivision and/or land development within a Flood Control District shall comply with all provisions of the Chester Township Flood Control Ordinance [Chapter 8] and as provided in the Zoning Ordinance [Chapter 27] and the Building Code [Chapter 5], and the rules and regulations of the Pennsylvania Department of Environmental Resources.

J. All areas containing lakes, ponds, wetlands and watercourses shall be considered to be reserved for permanent open space. Any alteration, development, filling, piping or diverting of such water resources shall be in strict compliance with the provisions of the Zoning Ordinance [Chapter 27], especially those pertaining to the Flood Zone, and all prevailing rules and regulations of the State and Federal government.

K. The Township Council may require that a landowner or developer provide reasonable corrective measures to alleviate an existing off-site drainage problem which may be affected by the proposed subdivision and/or land development. It shall be the responsibility of the landowner or developer to obtain all drainage easements on, over, or through other properties, and the Township, its agents,

workmen, servants and employees shall be indemnified and held harmless from any liability.

L. Any water originating from non-natural sources, such as swimming pools, air conditioning units, sump pumps, roof drains, or other similar flows, shall be properly discharged into natural watercourses or storm drains.

M. For the purpose of this Section, streams and intermittent streams are defined as those watercourses depicted on the Township Map, the U.S.G.S. maps of the area, and/or determined as such pursuant to on-site survey by the Township or its representative.

4. Specific Design Standards.

A. Design Flow Rate. The storm sewer system shall be designed to carry a ten (10) year peak flow rate, with a twenty-five (25) year peak flow rate at all low points. The peak flow rate into each inlet shall be indicated on the stormwater drainage plan. The design flow rate shall be determined by the rationale formula, $Q=CIA$.

Where:

Q = Peak Runoff Rate, cubic feet per second (CFS)

C = Runoff coefficient equal to the rate of the peak runoff rate to the average rate of rainfall over a time period equal to the time of concentration

I = Average rainfall intensity in inches per hour for a time equal to the time of concentration

A = Drainage area in acres

B. Appropriate values for the runoff coefficient and rainfall intensity shall be taken from the following source:

Commonwealth of Pennsylvania
Department of Transportation
Design Manual, Part 2
Highway Design
August 1981 (or the latest revision thereto)

C. Storm Sewer System Design.

(1) The storm sewer system shall be designed to the more restrictive of the following: to collect stormwater at any point where three (3) to five (5) cubic feet per second is accumulated during the design storm; and/or inlets/manholes shall not be spaced more than three hundred (300) feet apart on pipe sizes up to twenty-four (24) inches in diameter and not more than four hundred (400) feet apart on greater sizes.

(2) Inlets, manholes, grates, covers, frames, and the like shall conform to the Pennsylvania Department of Transportation Roadway Construction Standards (Publication No. 72) and Form 408 Specifications, and all amendments, revisions updated thereto.

D. Bridge/Culvert/Channel Design.

(1) Bridges and culverts shall have ample waterway to carry expected flows, based on a minimum storm frequency of twenty-five (25) years. Bridge and/or culvert design shall be in accordance with the Pennsylvania Department of Transportation and/or the Pennsylvania Department of Environmental Resources requirements. All culverts shall be provided with concrete end sections unless approved otherwise by the Township.

(2) All drainage channels shall be designed to carry a flow rate equal to a one hundred (100) year, twenty-four (24) hour storm.

(3) All drainage channels shall be designed to prevent the erosion of the bed and bank areas. The flow velocity in all vegetated drainage channels shall not exceed the maximum permissible velocity to prevent erosion. Suitable bank stabilization shall be provided where required to prevent erosion of the drainage channels. Where storm sewers discharge into existing drainage channels at an angle greater than thirty (30) degrees from parallel with the downstream channel flow, the far side bank shall be stabilized by the use of rip-rap, masonry, and/or concrete walls. The stabilization shall be designed to prevent erosion and frost heave under and behind the stabilizing media.

(4) Any vegetated drainage channel requiring mowing of the vegetation shall have a maximum slope of three (3) horizontal to one (1) vertical on those areas to be mowed.

(5) The design of all channels shall, as a minimum, conform to the design procedures outlined in:

U.S. Department of Transportation
Federal Highway Administration
Roadside Drainage Channels
Hydraulic Design Series No. 4

U.S. Department of Transportation
Federal Highway Administration
Design Charts for Open Channel Flow
Hydraulic Design Series No. 3

Standards and Specifications for Soil
Erosion and Sediment Control in Developing
Areas - U.S. Department of Agriculture, Soil
Conservation Service, College Park, Maryland

E. Overflow System. An overflow system shall be provided to carry flow to the detention basin when the capacity of the storm drain pipe system is exceeded. The overflow system shall be of sufficient capacity to carry the difference between the hundred (100) year and the ten (10) year peak flow rates.

F. Inlet Capacity. All inlets must be designed to accommodate the ten (10) year peak flow rate except at low points where they shall accommodate the twenty-five (25) year peak flow rate. The capacity of Type C, M, or S inlets shall be determined from the following source:

Commonwealth of Pennsylvania
Department of Transportation
Design Manual, Part 2,
Highway Design, August 1981 (or the most recent
revisions thereto)
Chapter 10

G. The capacity of each inlet shall be indicated on the storm-water drainage plan. All stormwater management plans shall indicate that inlet grades be installed in such a manner that the roadway stormwater will be directed into the inlet and away from the roadway. At curbed street/driveway intersections, inlets shall be placed on the tangent section and not in the curved portion of the curbing.

H. Straight Pipe Sections. Wherever possible, all storm sewers shall be designed to follow straight courses. No angular deflections of storm sewer pipe sections in excess of five (5) degrees shall be permitted. no vertical curves shall be permitted in the storm sewer system.

I. Minimum Grade and Size. All storm drain pipes shall be designed to maintain a minimum grade of one (1.0) percent. All storm sewer pipes shall have a minimum inside diameter of fifteen (15) inches.

J. Pipe Capacity. The capacity of all pipe culverts shall, as a minimum, provide the required carrying capacity as determined by the following sources:

United States Department of Transportation
Federal Highway Administration
Hydraulic Engineering Circular No. 5
Hydraulic Charts for the Selection of
Highway Culverts

United States Department of Transportation
Federal Highway Administration
Hydraulic Design Series No. 3
Design Charts for Open-Channel Flow

United States Department of Transportation
Bureau of Public Roads
Hydraulic Engineering Circular No. 10
Capacity Charts for the Hydraulic Design of
Highway Culverts

K. Pipe Arches. Where headroom is restricted, equivalent pipe arches may be used in lieu of circular pipes.

L. Pipe Material and Gauge Thickness. All storm sewers shall be either reinforced cement concrete, corrugated aluminum or corrugated galvanized steel pipe. Storm sewers shall be of the proper class and thickness to support the above fill material. Pipe class and gauge or thickness shall be noted on the plans.

M. Allowable Headwater Depth. At all inlets or manholes, the maximum allowable headwater depth shall be one (1) foot below the top of the inlet grate or the manhole cover.

N. Horizontal Pipe Deflections. A manhole or inlet shall be provided at all horizontal deflections in the storm pipe system exceeding five (5) degrees.

O. Minimum and Maximum Cover. A minimum of eighteen (18) inches of cover shall be maintained over all storm drain pipes. The top of storm drain pipes shall be at least one-half (0.5) foot below subgrade elevation. The maximum cover over storm drain pipes shall be ten (10) feet unless approved otherwise by the Township.

P. Storm Sewer System Outlets. Storm sewer outlet pipes shall extend to proposed stormwater management facilities, natural watercourses, and the like. A concrete endwall shall be required on all storm sewer system outlet pipes.

Q. Roof Drains. Stormwater roof drains shall not discharge water directly over a sidewalk, into any sanitary sewer line, or into a street or paved area without a straight curbed gutter.

R. Drainage Easements.

(1) All storm sewer easements through undedicated land shall be a minimum of twenty-five (25) feet in width.

(2) Where a site is traversed by a watercourse, a drainage easement or right-of-way conforming substantially with the line of such watercourse and of such width as will be adequate to preserve natural drainage and provide sufficient width for maintenance shall be created, as determined by the Township.

S. Diversion of Runoff. All storm sewers and/or drainage swales shall be designed to carry the runoff into a detention basin or similar facility utilized to control the rate of runoff, unless approved otherwise by the Township.

T. Runoff Control Measures.

(1) Runoff Control. The rate and quantity of stormwater runoff from any proposed subdivision and/or land development shall not exceed the rate and quantity of runoff prior to development (i.e. both high frequency and low frequency.)

(2) Runoff Control Devices. The increased runoff which may result from subdivisions and/or land developments shall be controlled by permanent runoff control measures that will provide the required runoff control specified above. All runoff control devices will be evaluated for their effectiveness to maintain the above mentioned standard for all storms with a return period of up to one hundred (100) years.

(3) Detention Basins vs. Other Available Methods. Detention basins are the most desirable technique for controlling the rate of runoff from a subdivision and/or land development. However, the use of other available runoff control measures is allowable.

(4) Groundwater Recharge. In general, all runoff control measures shall be designed to encourage groundwater recharge and shall be permitted only if suitable surface conditions are present. Soils testing and certification by a registered professional engineer, geologist, soils scientist, or the like, shall be required before any groundwater recharge system will be allowed.

U. Detention/Retention Basins.

(1) Detention basins shall be designed in accordance with the Soil Cover Complex Method and the procedures developed by the U.S. Department of Agriculture, Soil Conservation Service, as outlined in their Technical Release No. 55, Urban Hydrology for Small Watersheds with specific attention given to antecedent moisture conditions, flood routing and peak discharge and Hydrology National Engineering Handbook, Section 4.

(2) Basins shall be designed to detain the quantity of water resulting from a one hundred (100) year, twenty-four (24) hours storm (7.2 inches of rainfall) under full development conditions. Storm water management calculations shall ensure that the pre-developed discharge from the site for the following storms is not exceeded after development:

| | | |
|-----------|----------|------------------------|
| 2-year, | 24 hour, | 3.3 inches of rainfall |
| 10-year, | 24 hour, | 5.0 inches of rainfall |
| 25-year, | 24 hour, | 5.7 inches of rainfall |
| 50-year, | 24 hour, | 6.4 inches of rainfall |
| 100-year, | 24 hour, | 7.2 inches of rainfall |

(3) The following criteria shall apply in the calculation of stormwater runoff values: The time of concentration method shall be utilized in the development of the runoff hydrographs and peak discharge. Storage discharge curves shall be provided for all basins.

(a) Meadow condition shall be used as the basis for establishing the predeveloped runoff values for all area other than woodland, including areas which are presently covered by impervious surfaces except as stated below.

(b) In the case of an expansion of an existing development, a waiver may be requested from the Township Council, to exclude only existing impervious areas from the requirements of subsection (a), above; provided, that the existing development does not presently contribute to an existing drainage problem downstream.

(c) Average antecedent moisture conditions.

(d) A Type II distribution storm.

(4) Outlet Control Structures.

(a) All outlet control structures shall be constructed of galvanized steel, aluminum or concrete, properly anchored

to prevent flotation, and equipped with childproof, non-clogging trash racks overall design openings twelve (12) inches or greater in diameter, except those openings designed to carry perennial stream flows.

(b) Temporary sedimentation controls shall be provided during construction to prevent the flow of sediment through the basin outlet pipe. Such measures may include temporary riser pipes, rock-filled gabions, plywood standboxes, silt fences, and the like.

(5) Emergency Spillways. Whenever possible, the emergency spillway for basins shall be constructed on undisturbed ground. Emergency spillways shall be constructed of reinforced concrete, vegetated earth, concrete rubble, and the like. All emergency spillways shall be constructed so that the basin berm is protected against erosion. The minimum capacity of all emergency spillways shall be such that the combined capacity of the emergency spillway and the principal pipe spillway be equal to the peak flow rate from the one hundred (100) year design storm after development. Emergency spillways shall extend along the upstream and downstream berm embankment slopes. The emergency spillway shall not discharge stormwater over earthen fill and/or easily erodible material without adequate protection against erosion.

(6) Freeboard. The minimum freeboard shall be two (2) feet. (Freeboard is the difference between the design flow elevations in the emergency spillway and the top of the settled basin embankment.)

(7) Anti-Seep Collars. Anti-seep collars shall be installed around principal pipe barrel within the normal saturation zone of the basin berms. The anti-seep collars and their connections to the pipe barrel shall be watertight. The anti-seep collars shall extend to a minimum of two (2) feet beyond the outside of the principal pipe barrel. The maximum spacing between collars shall be fourteen (14) times the minimum projection of the collar measured perpendicular to the pipe.

(8) Basin Outlets. Energy dissipating devices (rip-rap, silting basin, concrete aprons, and the like) shall be placed at all basin outlets. Rock level spreader berms shall be required where basins do not discharge into an existing drainage swale, ditch or channel. Concrete endwalls shall be placed at all basin outlets. All basin outlet pipes twelve (12) inches in diameter or greater shall be equipped with childproof devices.

(9) Slope of Detention Basin Embankment. The maximum slope of earthen basin embankments shall be three (3) to one (1). The top or toe of any slope shall be located a minimum of fifteen (15) feet from adjacent property lines with the exception of the downstream property line where the toe of the embankment shall be placed a sufficient distance to allow for energy dissipating devices but in no case less than thirty (30) feet unless approved by the Township. Whenever possible, the side slopes and basin slope shall blend with the natural topography.

(10) Width of Berm. The minimum top width of detention basin berms shall be ten (10) feet.

(11) The maximum depth of the basin shall not exceed ten (10) feet.

(12) Construction Specifications. The plans shall indicate the construction specifications and compaction requirements for all detention/retention basins.

(13) Slope of Basin Bottom. In order to ensure proper drainage of detention basins, a minimum grade of two (2) percent shall be maintained for all sheet flow. A minimum grade of one (1) percent shall be maintained for all channel flow.

(14) Cut-Off Trench. A cut-off trench shall be excavated along the centerline of the dam on earth fill embankments. The minimum depth shall be three (3) feet. The minimum bottom width shall be ten (10) feet or wide enough to permit operation of compaction equipment. The side slopes shall be no steeper than one to one (1:1). The trench shall be kept free from standing water during the backfilling operations.

(15) Grading and Landscaping of Basin.

(a) Cuts and Fills. No excavation or fill shall be made with a cut or fill slope steeper than three (3) horizontal to one (1) vertical, except where the excavation or fill is sufficiently stable to prevent sliding or erosion and will not result in property damage or personal injury. A written statement shall be required from a civil engineer licensed by the Commonwealth of Pennsylvania, having experience in soils engineering, certifying that he has inspected the site and that any proposed deviation from the slope specified above should not endanger any property or result in personal injury. Retaining walls will be required if a stable slope cannot be maintained. Any retaining wall design must be designed by an experienced structural engineer licensed by the Commonwealth of Pennsylvania. The toe of any cut or fill slope must be located a minimum of fifteen (15) feet from adjacent property lines with the exception stated in this Chapter.

(b) Landscaping.

(i) A minimum of six (6) inches of top soil shall be placed on all areas affected by the basin construction (bottom of basin, side slopes, top of berm, and the like.)

(ii) All earthen basins shall be stabilized with temporary and permanent grasses or other approved ground covers within fifteen (15) days after initial construction.

(iii) Fencing and a suitable vegetation screen shall be provided around all detention/retention basins unless the Township Council determines that such screening is not necessary.

(iv) A landscape plan at a minimum scale of one (1) inch equals thirty (30) feet shall be submitted with each application. Such plan must be scaled by a landscape architect registered in the Commonwealth.

(v) At the completion of construction an "as-built" plan signed and sealed by a registered engineer or surveyor shall be submitted for Township records.

(c) Basins shall be installed prior to any earthmoving or land disturbances which they will serve.

V. Subsurface Disposal of Stormwater.

(1) Subsurface disposal of stormwater shall be allowed only where natural, well-drained soils exist and only after on-site percolation tests, certified by a registered professional engineer experienced in soils engineering, geologist, qualified soils scientist, or the like, are performed.

(a) Soils testing to determine percolation rates shall be performed at several locations where the subsurface facility is proposed and also at the proposed invert elevation of the subsurface facility.

(b) All percolation tests shall be conducted in accordance with the rules, regulations and procedures of the Pennsylvania Sewage Facilities Act (537), as required by the Pennsylvania Department of Environmental Resources.

(2) Various methods of subsurface disposal may be employed. The effectiveness and applicability of each should be evaluated at each location. Acceptable methods include, but are not limited to, infiltration basin and/or berms, seepage beds and/or trenches, and the like.

(3) The design and construction of all subsurface facilities shall provide proper procedures to prevent silt from clogging the aggregate backfill.

(4) The following procedures and materials shall be required for all subsurface facilities;

(a) Excavation for the infiltration facility shall be performed with equipment which will not compact the bottom of the seepage bed/trench, or like facility.

(b) The bottom of the bed and/or trench shall be scarified prior to the placement of aggregate.

(c) Only clean aggregate, free of fines, shall be allowed.

(d) The top and sides of all seepage beds, trenches, or like facilities shall be covered with drainage filtration fabric.

(e) Perforated distribution pipes connected to centralized catch basins and/or manholes with provisions for the collection of debris shall be provided in all facilities. The perforated pipes shall distribute stormwater throughout the entire seepage bed/trench, or like facility.

(f) A positive outlet pipe placed at or near the bottom of the seepage bed and/or trench, or like facility shall be provided.

(g) The landowner or developer shall be responsible for the proper installation, operation and maintenance of all subsurface stormwater management facilities. If in the opinion of the Township the underground system is not functioning properly, the landowner or developer shall be required to make the necessary improvements/corrections to the system or provide an alternate stormwater management facility which is functional.

W. Maintenance of Facilities.

(1) All stormwater management facilities, including retention and detention basins designed and constructed for the purposes specified under this Chapter, shall be maintained in proper working order in accordance with those design plans filed with the Township and shall be the responsibility of the property owner(s) upon whose property the facilities are located. In the case of a homeowners association or other entity approved by the Township, the homeowners association or other entity shall be considered the responsible owner of all stormwater management facilities located in the area of development.

(2) In order to ensure proper maintenance and function of stormwater management facilities, the Township or its designee shall perform inspections, carried out on a random basis.

(3) If, at any time, the Township, or its designee, discovers any violation or condition not conforming with those designs or plans filed with the Township in regard to the operation of a stormwater management facility, they shall notify the responsible owners of the violation, informing them of the nature of such violation and the manner in which it can be corrected.

(4) Under no conditions shall any person be allowed to modify, alter or change a previously approved stormwater management facility unless an approved alternate facility is approved by the Township.

(5) Under no conditions shall any person be allowed to modify, alter, or change a previously approved stormwater management facility unless approved by the Township.

(6) In the event the landowner, developer, occupant, or homeowners association, as the case may be, shall refuse or neglect to comply with the provisions of this Chapter as interpreted by the Township, the Township may direct the work to correct any violation or noncompliance with the terms of this Chapter.

(7) Maintenance of all drainage facilities and watercourses within any subdivision and/or land development is the responsibility of the landowner or developer until they are accepted by the Township.

(8) It is the responsibility of any landowner or developer doing any act on or across a communal stream, watercourse or swale or upon the floodplain or right-of-way thereof to maintain as nearly as possible in its present state the stream, watercourse, swale, floodplain or right-of-way for the duration of the construction activity and to return it to its original or equal condition after such activity is completed.

(9) Maintenance of drainage facilities or watercourses originating on private property is the responsibility of the owner to their point of open discharge at the property line or at a communal watercourse within the property.

(Ord. 1-1993, 2/4/1993)

§409. Erosion and Sedimentation Control.

1. General Requirements.

A. All earthmoving activities shall be conducted in such a way as to prevent accelerated erosion and the resulting sedimentation.

B. No change shall be made in the contour of the land, and no grading, excavating, removal or destruction of the topsoil, trees or other vegetative cover shall be commenced in any proposed subdivision or land development until such time as a conservation plan has been prepared.

C. The conservation plan shall be developed in the form outlined in the "Soil Erosion and Sedimentation Control Manual," issued by the Department of Environmental Resources.

D. Final approval for a development tract of twenty-five (25) or more acres will be contingent upon the issuance of a permit by the Pennsylvania Department of Environmental Resources.

E. Measures used to control erosion and reduce sedimentation shall meet the standards and specifications of the Delaware County Conservation District.

F. The Township Engineer, or other designated local official, shall ensure compliance with the appropriate specifications, copies of which are available from the Delaware County Conservation District.

2. Grading for Drainage.

A. Grading for drainage shall be performed whenever necessary in order to provide more suitable sites for building and other uses, improve surface drainage, and control erosion.

B. All lots, tracts, or parcels in a proposed subdivision or land development shall provide property drainage away from buildings and dispose of surface water without ponding except where an alternative drainage system is approved by the Township Commissioners. Natural drainage patterns shall be preserved whenever possible.

C. All drainage facilities shall be designed to adequately handle the surface runoff and carry it to the nearest suitable outlet, such as a curbed street, storm drain, or natural watercourse. When drainage swales are used to divert surface waters away from buildings, they shall be sodded or planted and shall be of such slope, shape, and size as to conform with the requirements of the Delaware County Conservation District. Concentration of surface water runoff shall be permitted only in swales or watercourses. In the case of single-family or multi-family development, swales extending three (3) or more contiguous lots shall be interrupted by an inlet or redirected to the street.

D. Cut and fill slopes shall be no steeper than two (2) horizontal feet to one (1) vertical foot unless stabilized by a retaining wall or curbing or are approved by the Township Engineer subject to special conditions.

E. Adequate provisions shall be taken to protect against adverse effects of cut and fill.

F. Fills shall not encroach on natural watercourses or constructed channels; when placed adjacent to natural watercourses or constructed channels they shall have suitable protection against erosion during periods of flooding.

G. During grading operations, necessary measures for dust control will be exercised.

H. Grading equipment will not be allowed to cross live streams. Provisions will be made for the installation of culverts.

3. Performance Principles.

A. The following measures are effective in minimizing erosion and sedimentation and shall be included, when applicable, on the conservation plan:

(1) Stripping of vegetation shall be done in such a manner as will minimize erosion.

(2) Salient natural features should be preserved when possible and cut-fill operations shall be kept to a minimum to create the least erosion potential.

(3) The disturbed area and the duration of exposure shall be kept to a practical minimum.

(4) Temporary vegetation and or mulching shall be used to protect exposed critical areas during development.

(5) The permanent vegetation and structural erosion and drainage measures shall be installed as soon as practical in the development.

(6) Provisions shall be made to effectively accommodate the increased runoff caused by changed soil and surface conditions during and after development. Where necessary, the rate of surface water runoff will be structurally retarded.

(7) Sediment in the runoff water shall be trapped until the disturbed area is stabilized by the use of debris basins, sediment basins, silt traps, or similar measures.

4. Natural Features Preservation.

A. General Requirements. The design and development of all subdivisions and land developments shall preserve, whenever possible, natural features such as site terrain, woodlands, specimen trees, natural watercourses and bodies of water, wetlands, rock outcroppings and scenic views.

B. Topography. The natural terrain of the proposed subdivision or land development shall be retained whenever possible. Cut and fill shall be kept to a minimum. Cut and fill operations shall be used either to achieve acceptable minimum standards (for street grades, parking areas, building sites) or to enhance the quality of site design (e.g. berms or swales which add visual interest and perform functions such as screening or drainage.)

C. Vegetation and Planted Screens.

(1) Significant tree masses and specimen trees shall be preserved wherever possible. The buildings should be located within the allowable building area in such a manner as to minimize damage to vegetation. Where possible, existing open areas should be developed instead of wooded areas. Areas in which trees are retained should remain undisturbed out to the canopy drip line and at the original grade level wherever possible.

(2) Effective planted visual screens shall be provided along the rear of reverse frontage lots and along side and/or rear property lines of lots traversed by zoning boundary lines which separate a residential district from a nonresidential district.

(3) Existing wooded areas shall be protected to prevent unnecessary destruction. Trees with a minimum trunk caliper of six (6) inches, measured eighteen (18) inches above ground, shall be maintained or replaced immediately following construction. Replacement trees shall be a minimum trunk caliper of two (2) inches at a height of eighteen (18) inches above finished grade.

(4) Trees shall be required in all new subdivisions and land developments and shall be provided in accordance with the following standards:

(a) No tree shall be planted within the street right-of-way.

(b) At least one (1) tree shall be planted on each lot in a subdivision.

(c) Such tree shall be planted in the front yard.

(d) All such trees shall be sound, healthy, and vigorous and shall be free of insects, insect eggs, and larvae.

(e) The trunk caliper, measured at the height of eighteen (18) inches, shall be a minimum of two (2) inches.

D. Aquatic Features. Aquatic features such as natural water-courses, bodies of water and wetlands shall be protected wherever possible. Where practicable, stream and river frontage shall contain an access point to the water. Maintenance easement areas shall be provided at intervals of no more than one-half ($\frac{1}{2}$) mile. These access points shall be not less than twenty-five (25) feet in width.

E. Wetlands. See §404 of the Federal Clean Water Act (1977), and Chapter 105 of the Pennsylvania Dam Safety and Encroachment Act (1978), as amended, December 1989, for requirements relating to development of wetland areas.

F. Floodplain Protection. See the Township Zoning Ordinance [Chapter 27].

(Ord. 1-1993, 2/4/1993)

§410. Miscellaneous Provisions.

1. Sidewalks and Curbs.

A. All property owners shall install, construct and maintain sidewalk and curbing along such property abutting any street, in accordance with the specifications of the Township Engineer, the BOCA Building Code [Chapter 5], and this Chapter under the following circumstances:

(1) Whenever a building is newly constructed and erected within the Township.

(2) Whenever an alteration is made to an existing building.

(3) Whenever subdivision approval is granted pursuant to this Chapter.

B. At the time of transfer or resale of any premises within the Township and as part of the inspection conducted prior to the issuance of the required certificate of occupancy, the Building Inspector shall inspect all sidewalks, curbs and driveway aprons; and any and all sidewalks, curbs and driveway aprons in a state of disrepair shall be maintained, repaired and/or replaced prior to the issuance of the certificate.

C. All sidewalks and curbs required to be installed, constructed and maintained pursuant to the above subsections shall be installed according to the specifications of the Township Engineer including, but not limited to, the following:

(1) Curbs shall be installed sixteen (16) feet back from the centerline of a local street and eighteen (18) feet back from the centerline of a collector street.

(2) There shall be a four (4) foot grass strip between all sidewalks and curbs.

(3) All sidewalks shall be a minimum of four (4) inches thick with a four (4) inch stone subbase.

With respect to the installation of curbing and sidewalks, on all property which abuts a State highway, the property owner must first request and receive PennDOT approval of the installation of said curbing and sidewalk and the location thereof.

D. All construction, installation, maintenance and repair of all sidewalks and curbing, as required above, shall be at the expense and cost of the property owner, plus any such widening of the street deemed necessary is to be at the expense and cost of the property owner.

2. Fire-Fighting Access Easements and Fire Hydrants.

A. In areas where, in the opinion of the Township Fire Marshall, there exist any fire hazards, unobstructed fire protection access easements shall be provided. The size, location, design and grading of such easements shall be recommended by the Fire Marshall.

B. The need, location, design and related features of fire hydrants shall be determined by the Fire Marshall in accordance with applicable laws and regulations.

3. Street Names and Address Numbering.

A. Proposed streets which are in alignment with existing, named streets shall bear the name of the existing street.

B. In no case shall the name of a proposed street duplicate or substantially approximate an existing street name in the Township, in order to avoid confusion and delay in the operations of the postal service, police department or emergency vehicles.

C. All proposed street names shall be subject to the approval of the Town Council after consultation with the local Postmaster, Fire Marshall and Police Chief.

D. Streets shall be identified by signs approved by the Township Secretary or Township Engineer.

E. In all subdivisions and land developments commenced after the effective date of this Chapter, the address numbers shall be assigned by the Township Engineer and shall be clearly visible from the street.

4. Street Lighting. Street lights shall be installed in all subdivision and land developments in accordance with the Township Engineer and the appropriate utility company. The exact location of all street lights shall be indicated on the final plan, after consultation with the Township Engineer.

(Ord. 1-1993, 2/4/1993)