JEFFERSON TOWNSHIP
LACKAWANNA COUNTY, PENNSYLVANIA

STORMWATER MANAGEMENT ORDINANCE
WALLENPAUPACK CREEK and
LACKAWANNA RIVER WATERSHEDS

Ordinance-93-1

AUGUST 1993

Prepared by
Jefferson Township Planning Commission
Jefferson Township Board of Supervisors

Based on
The Lackawanna River Watershed
Stormwater Management Plan Model Ordinance

prepared by
The Lackawanna County Regional Planning Commission

and the
Wallenpaupack Creek Watershed
Stormwater Management Plan Model Ordinance

prepared by
The Lake Wallenpaupack Watershed Management District

Community Planning and Transportation Associates

Carson Helfrich
HC Box 59
Paupack, PA 18451
(717) 857-0282

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(Note: Lackawanna River Watershed Appendices are under separate cover.)

STORMWATER MANAGEMENT ORDINANCE

ARTICLE I
GENERAL PROVISIONS

SECTION 101. STATEMENT OF FINDINGS

The Board of Supervisors of Jefferson Township, Lackawanna County, Pennsylvania finds that:

A. Inadequate management of accelerated runoff of stormwater resulting from development throughout a watershed increases flood flow volume velocities, contributes to soil erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control storm water, undermines floodplain management and flood control efforts in down-stream communities, reduces groundwater recharge, deteriorates the water quality of the receiving waters, and threatens public health, safety and welfare.

B. A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated erosion, is fundamental to the public health, safety and welfare and the protection of the people of the Township and all the people of the Commonwealth, their resources and the environment.

SECTION 102. PURPOSE

The purpose of the Ordinance is to promote the public health, safety, and welfare within the Wallenpaupack Creek Watershed and the Lackawanna River Watershed in the Township by minimizing the damages described in Section 101.A of the Ordinance. To accomplish this, the Ordinance establishes a comprehensive stormwater management program designed to:

A. Control accelerated runoff and erosion and sedimentation problems at their source by regulating activities which cause such problems.

B. Require the installation and maintenance of soil erosion and sedimentation controls during and after earth disturbance and land development activities.

C. Utilize and preserve the desirable existing natural drainage systems.

D. Encourage recharge of groundwater.

E. Maintain the existing flows and quality of streams and water courses in the Township and the Commonwealth.

F. Preserve and restore the flood carrying capacity of streams.

G. Provide for proper design, installation, and maintenance of all permanent storm water management structures which are constructed in the Township.

SECTION 103. STATUTORY AUTHORITY

The Jefferson Township Board of Supervisors is hereby empowered to regulate these activities by the authority of the "Stormwater Management Act," Act 167 of October 4, 1978 (P.L. 864, No. 167); and the "Second Class Township Code", Act 69 of May 1, 1933, (P.L. 103, No. 69) as reenacted and amended.

SECTION 104. APPLICABILITY

A. This Ordinance shall apply to all areas of the Township located within the Wallenpaupack Creek Watershed and the Lackawanna River Watershed. No development, construction or other activity which will result in the earth disturbance of any area in the Township shall be undertaken except in conformity with this Ordinance and any other applicable local, state or federal regulations. The Appendices attached to and included in this Ordinance are applicable to the Wallenpaupack Creek Watershed. For those areas in the Lackawanna River Watershed, Appendix references are to the Lackawanna River Watershed Stormwater Management Plan Appendices issued by the Lackawanna County Regional Planning Commission which are incorporated herein by reference.

B. This Ordinance contains only those stormwater runoff control criteria and standards which are necessary or desirable from a total watershed perspective. Additional storm water controls of more stringent specifications may be required by the Board of Supervisors in specific cases where such controls are necessary to protect the public health, safety and general welfare and to meet the intent of this Ordinance, the Pennsylvania Storm Water Management Act, the Wallenpaupack Creek Watershed Stormwater Management Plan, and the Lackawanna River Watershed Stormwater Management Plan.

C. The following land disturbance activities are defined as Regulated Activities and shall be regulated by this Ordinance, except those individual land disturbance activities which meet the criteria to qualify for exemption, as set forth in Section 402, Exemptions.

1. General land disturbance activities, including but not limited to, clearing, filling, and excavating.
2. Land development.
3. Subdivision.
4. Agricultural operations.
5. Construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc.)
6. Construction of new buildings and structures or additions to existing buildings and structures.
7. Forest management operations and nursery operations.
8. Diversion or piping of any natural or man-made drainage channel.
9. Installation of stormwater systems or appurtenances thereto.

For development taking place in stages, the entire development plan shall be used in determining conformance with this Ordinance. Additional impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks constructed as part of or for the proposed Regulated Activity. Any areas which may be designed to initially be semi-pervious (e.g. gravel, crushed stone, porous pavement, etc.) shall be considered impervious areas for the purpose of exemption or waiver evaluation. No waiver or exemption shall be provided for Regulated Activities as defined in Section 104,C,8 and 104,C,9 of this Ordinance.

ARTICLE II
DEFINITIONS

Unless otherwise stated, the following words shall, for the purpose of this Ordinance, have the meaning herein indicated. Words in the present tense include the future tense. Words in the singular include the plural and words in the plural include the singular. The word "shall" is mandatory and not discretionary. The word "may" is permissive. Words not defined herein shall be construed to have the meaning given by common and ordinary use.

Accelerated Erosion - The removal of the surface of the land through the combined action of man's activities and natural processes at a rate greater than would occur because of the natural processes alone.

Act - The Pennsylvania Storm Water Management Act of October 4, 1978 (P.L. 864, No. 167).

Aggregate - Term for the stone or rock gravel needed to fill in an infiltration stormwater control facility such as a trench or porous pavement.

Agricultural Operations - All activities connected with farming including dairying, pasturage, agriculture, apiaries, horticulture, floriculture, forest management, viticulture, and animal and poultry husbandry.

Agricultural Waste - Wastes that have their origin from agriculture. Most such wastes are associated with the production of food and fiber on farms, ranges, and forests. These wastes normally include animal manure, crop residues, dead animals, and agricultural chemicals.

Bank Stabilization - Includes grade stabilization structures to stabilize soils and, in some cases, provide some stormwater infiltration.

Bedrock - The more or less solid rock in place either on or beneath the surface of the earth. It may be soft, medium or hard and have a smooth or irregular surface.

Best Management Practice (BMP) - A non-point source pollution control practice that is developed by a process that considers water quality impacts, as well as political, social, economic, and technical feasibility.

Board - The Jefferson Township Board of Supervisors.

Borings - Cylindrical samples of a soil profile used to determine infiltration capacity.

Channel - A natural or artificial watercourse with a definite bed and banks which confine and conduct continuously or intermittently flowing water. See "Watercourse".

Channel Erosion - The widening, deepening, and headward cutting of small channels and waterways, due to erosion caused by moderate to large floods.

Channelization - Any artificial reconstruction of a stream channel such as straightening, lining, or deepening.

Cistern - An underground or above ground reservoir or tank for storing rainwater.

Commercial Land Use - Any use involving in part or in whole the sale of merchandise, materials or services.

Conduit - Any channel intended for the conveyance of water, whether open or closed.

Conservation District - A public organization created under State enabling law as a special purpose district to develop and carry out a program of soil, water, and related resource conservation, use, and development within its boundaries, usually a subdivision of State government with a local governing body and always with limited authorities. Often called a soil conservation district or a soil and water conservation district. For this Ordinance Conservation District applies to the County Conservation District.

Contour - An imaginary line on the surface of the earth connecting points of the same elevation. A line drawn on a map connecting points of the same elevation.

Cover Crop - A close-growing crop grown primarily for the purpose of protecting and improving soil between periods of permanent vegetation.

Critical Area - An area defined by this ordinance to require more stringent control of post-development runoff flow rates and/or pollutant loads than those specified for the general watershed area.

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

Design Storm - The magnitude of precipitation from a storm event measured in probability of occurrence (e.g., 50-yr. storm) and duration (e.g., 24-hour), and used in the planning and design of stormwater management control systems.

Detention Basin - A basin designed to retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate. Detention basins are designed to drain completely after a storm event.

Detention Time - The amount of time a parcel of water actually is present in a stormwater control facility. Theoretical detention time for a runoff event is the average time parcels of water residue in the basin over the period of release from the facility.

Developer - A person or persons, partnership, association, corporation or other entity, or any responsible person therein or agent thereof, that undertakes any Regulated Activities covered by this Ordinance.

Development Site - The specific tract of land for which a Regulated Activity is proposed.

Diversion - A channel with a supporting ridge on the lower side constructed to a predetermined grade across or at the bottom slope, and designed to collect and divert surface runoff from slopes which are subject to erosion.

Drainage - The flow of water or wastewater and the methods of directing such flow, whether natural or artificial.

Drainage Plan - The documentation of the proposed stormwater management controls, if any, to be used for the given development site, the contents of which are established in Section 403.

Earth Disturbance - Any construction or other activity which disturbs the surface of the land including but not limited to excavations, embankments, land development, subdivision development, mineral extraction and the moving, depositing or storing of soil, rock or earth.

Easement - A right granted by a land owner to a grantee, allowing the use of private land for certain public, quasi-public or private purposes such as stormwater management.

Emergent Plants - Aquatic plants that are rooted in the sediment but whose leaves are at or above the water surface. These wetland plants often have high habitat value for wildlife and waterfowl, and can aid in pollutant uptake.

Enforcement Officer - An individual designated and deemed qualified by the Township to execute the regulations set forth in this Ordinance.

Engineer - A professional engineer licensed as such in the Commonwealth of Pennsylvania, duly appointed as the Engineer for the Township.

Erosion - The removal of soil particles or rock fragments of the land surface by the action of running water, wind, ice, or other geological agents.

Eutrophication - The process of over-enrichment of water bodies by nutrients often typified by the presence of algal blooms.

Evaporation - The process by which a liquid is changed to a vapor or gas.

Evapotranspiration - The combined loss of water from a given area and during a specific period of time, by evaporation from the soil surface and by transpiration from plants.

Event Mean Concentration (EMC) - The average concentration of any pollutant measured during a storm runoff event. The EMC is calculated by flow-weighting each pollutant sample measured during a storm event.

FHWA - Federal Highway Administration, United States Department of Transportation (USDOT).

Frost-Heave - The upward movement of soil surface due to the expansion of ice stored between particles in the first few feet of the soil profile. May cause surface fracturing of asphalt or concrete.

Gabion - A large rectangular box of heavy gauge wire mesh which holds large cobbles and boulders. Used in streams and ponds to change flow patterns, stabilize banks, or prevent erosion.

Grade - A slope, usually of a road, channel, or natural ground, specified in percent (%) and shown on plans as specified herein. (To) Grade - To finish the surface of a roadbed, top of embankment or bottom of excavation.

7. Pennsylvania Department of Environmental Resources (PA DER).

8. Pennsylvania Department of Transportation (PA DOT).

9. U.S. Department of Agriculture, Soil Conservation Service, Pennsylvania (USDA, SCS, PA).

L. Oil and Grease Removal - Control facilities which receive stormwater from areas which are a potential source of oil and grease contamination if determined necessary by the Township to protect water quality shall include a baffle, skimmer, grease trap or other mechanism suitable for preventing oil and grease from leaving the facility in concentrations that would cause or contribute to violations of applicable water quality standards in the receiving waters.

M. Fencing - In cases where embankment slopes, depth, location or other feature of any stormwater control facility poses a threat to the public health, safety or welfare, the Township shall require fencing of such design and scope as approved by the Township to reasonably protect the public interest.

SECTION 302. STORMWATER MANAGEMENT SUBWATERSHEDS AND CRITICAL AREAS

302.1 STORMWATER MANAGEMENT SUBWATERSHEDS AND CRITICAL AREAS FOR THE WALLENPAUPACK CREEK WATERSHED

A. Mapping of Stormwater Management Subwatersheds - In order to implement the provisions of the Wallenpaupack Creek Watershed Stormwater Management Plan, the Watershed is hereby divided into stormwater management subwatersheds which shall be designated as follows: (Note: Although only a number of the subwatersheds include areas of the Township, the entire subwatershed list has been included for consistency with the Watershed Management Plan. Those subwatersheds which include areas of the Township are marked by an asterisk.)

Subwatershed Code	Subwatershed Name
E-WS	Wilson Creek
E-KC	Kintz Creek
E-BC	Bridge Creek
E-WC	East Branch Wallenpaupack
E-MC	Mozette Creek
M-SHC	Sugar Hill Creek
M-TC	Taylor Creek
M-WC	Main Branch Wallenpaupack
W-WC	West Branch Wallenpaupack *
M-MR	Manny Run
M-FR	Freeling Run
M-NC	Nevin Creek

M-MC	Mill Creek
M-RPC	Rock Port Creek
W-JC	Jones Creek *
W-PC	Potter Creek *
W-WiC	Wilcox Creek
W-WeC	Webster Creek
W-SC	Stevens Creek
W-MHC	Moss Hollow Creek
W-UC	Uban Creek
W-BC	Butternut Creek
M-WL	Waynewood Lake
L-LW	Lake Wallenpaupack
L-PC	Purdy Creek
L-FS	Finn Swamp
L-SC	Swan Creek
L-SpB	Spinner Brook
L-UT	Unnamed Tributary
L-SeB	Seeley Brook
L-DC	Diamond Creek
L-ShB	Sheridan Creek
L-MB	Mill Brook
L-KC	Kleinhaus Creek
L-PL	Pine Lake
L-AC	Ariel Creek
L-GP	Goose Pond
L-LL	Lake Lacawac
WC	D/S Wallenpaupack Creek

* Includes areas of the Township

The boundaries of the stormwater management subwatersheds are shown on an official map which is available for inspection at the township office.

B. Identification of Critical Areas - Critical areas for peak flow rate have been defined using the Release Rate formula. These release rates dictate the extent to which post-development runoff must be controlled. Within a given subwatershed, the post-development peak flow rate of storm runoff must be controlled to the stated percentage of the pre-development peak rate of storm runoff in order to protect downstream watershed areas. The Critical Areas and their respective release rate control design criteria for peak flow are as follows:

Subwatershed Code	Release Rate Percentage
E-WS	90
E-KC	80
E-BC	70
E-WC	70

E-MC	90
M-SHC	60
M-TC	90
M-WC[1]	70
M-WC[2]	100
M-WC[3]	80
M-WC[4]	100
M-WC[5]	80
M-WC[6]	80
M-WC[7]	60
M-WC[8]	80
M-WC[9]	100
W-WC[11]	80
W-WC[13]	60
W-WC[14]	60
M-WC[15]	100
M-MR	60
M-FR	90
M-NC	60
M-MC	80
M-RPC	70
W-JC	90 *
W-WiC	70
W-WeC	90
W-SC	60
W-MHC	70
W-UC	80
W-BC	80

Superscripts 1, 3, 5, 6, 7, 8, 11, 13, and 14 refer to portions of the main branch and west branch as delineated in the subwatershed map.

Critical areas for control of post-development runoff quality have been defined based on the projected pollutant loading of the subwatersheds. These areas include subwatersheds M-WC, W-WC*, M-WL, L-LW, L-SeB, L-DC, and L-AC. The control criteria for these critical areas are established as 0.13 mg/1 for phosphorous (as total soluble phosphorous) and 65 mg/l for sediment (as total suspended solids).

* Includes areas of the Township.

SECTION 302.2 STORMWATER WATERSHED MANAGEMENT STUDY AREAS AND RELEASE RATE CRITERIA FOR THE LACKAWANNA RIVER WATERSHED

A. Study Areas - Mapping of Storm Water Management Detail Study Areas - In order to implement the provisions of the Lackawanna River Storm Water Management Plan, the Lackawanna River Watershed is hereby divided into nine (9) Detailed Study Areas (Subareas) consistent with the Lackawanna River Watershed Map presented in the Plan.

The boundaries of the Subareas cross individual municipal boundaries, as shown on the Lackawanna River Watershed Map which is available for inspection at the Township office.

B. Determination of Applicable Release Rate - All areas of the Lackawanna River Watershed are subject to a release rate control/criteria. The release rate criteria only applies to the 100-year storm event. Additional control requirements for the mean-annual and 25-year events are post-to-pre control as defined in Section 302.2,C. All portions of the watershed outside the nine detailed study areas have a release rate of 100 percent or post-to-pre development control, but remain subject to individual municipal approval as discussed in #3 below. These areas are designated on Plate 4 in the Appendices of the Lackawanna River Watershed, Stormwater Management Plan as areas numbered 10. Prior to proceeding with preparation of stormwater control calculations or drainage plan preparations, the plan preparer/developer should first determine the release rate as follows:

1. Locate the proposed development property using Plate 4 of "The Lackawanna River Watershed Stormwater Management Plan."

2. If the site is located within Area 10 and not near the border of detailed study areas 1 through 9, or within a municipality listed in Table 4-1 of the LRW Stormwater Management Plan, the applied release rate is to be 100 percent.

3. If the site is located within Area 10 on Plate 4 but is within any part of a municipality listed in Table 4-1 of the LRW Stormwater Management Plan, the municipality must be contacted to verify that the release rate is 100 percent. The Table 4-1 municipalities may have portions of priority areas (subwatersheds 1 through 9) and non-priority areas (area 10) within their borders. Each municipality also has the ability to impose stricter release rate criteria for those Area 10 developments for ease of municipal-wide implementation.

[As example, a Table 4-1 municipality may have one-third of its municipal area designated as non-priority, Area 10, with 100 percent release rate. The other two-thirds could be in a priority watershed area which has an additional range of release rates (based on subarea identifications) from 100 percent down to 75 percent. The municipality may impose a municipal-wide release rate of 75 percent, which would meet the minimum criteria of the "LRW Stormwater management Plan." The plan preparer/developer must verify with each municipality that an Area 10 site has not been assigned an alternative release rate using the municipality's ordinance.]

4. If the site as identified from Plate 4 is located near the border of a detailed subwatershed, its location shall be verified by the associated detailed study area map in Appendix I of the Lackawanna River Watershed Stormwater Management Plan. Upon verification, release rate shall be determined by #3 above or #5 below.

5. If the site is located within a detailed subwatershed 1 through 9, the exact site location shall be determined and drawn on the appropriate map from Appendix I of the Lackawanna River Watershed Stormwater Management Plan. All subareas and their release rates which overlap the site shall be identified from the map and the Appendix F tables. A copy of the site location on the section of the Appendix I map shall be included as part of the drainage

plan submission. (Above referenced Appendices are Lackawanna River Watershed Stormwater Management Plan).

Once the release rate is defined and confirmed, stormwater analysis and design of control measures can proceed in accordance with the plan.

C. Release Rate Criteria - Any stormwater management controls required by this Ordinance and subject to release rate criteria shall meet the applicable release rate criteria, consistent with the calculation methodology specified in Section 303.2, as follows:

1. New land development controls are to incorporate infiltration of the first 1.5 inches of runoff (i.e., one-half of the mean-annual event) from impervious surfaces. At a minimum, infiltration facilities design/overflow capacity should be for the 10-year event. Post-to-pre flow control should be provided for the design capacity of the receiving storm water sewer systems, but in no case less than the 10-year storm event. This design criteria applies to small infill type developments (i.e., up to two single-family homes), or new driveways, additions or impervious surfaces less than 2,000 square feet total.

   Where infiltration is not feasible, based on demonstration of site constraints and approved by the reviewing agency, post-to-pre control of the mean annual and 10-year events is required. Where the receiving storm sewer system is designed for the 25-year event, post-to-pre control for the mean annual and 25-year event shall prevail.

2. Unless qualified under #1 above, 100-year control with applied release rates is required in addition to the requirements of section 302.2,C,1.

D. Detailed Area Boundaries - The exact location of the Storm Water Management Detailed Area boundaries as they apply to a given development site shall be determined by mapping the boundaries using the two-foot topographic contours provided as part of the Drainage Plan (Refer to subareas maps in the Lackawanna River Watershed Plan Appendix). The Area boundaries as originally drawn coincide with topographic divides or in certain instances, are drawn from the intersection of the watercourse and a physical feature (such as the confluence with another watercourse or a potential flow obstruction e.g. roads, culvert, bridge, etc.) to the topographic divide consistent with topography.

E. Downstream Capacity - Any downstream capacity analysis conducted in accordance with this Ordinance shall use the following criteria for determining adequacy for accepting increased peak flow rates:

1. Natural or man-made channels or swales must be able to convey the increased runoff associated with a 2-year return period event within their banks at velocities consistent with protection of the channels from erosion. Acceptable velocities shall be based upon criteria included in the DER Soil Erosion and Sedimentation Control Manual (February, 1985) and presented in the Lackawanna River Watershed Plan Appendix B.

2. Natural or man-made channels or swales must be able to convey the increased 25-year return period runoff peak within their banks or otherwise not create any hazard to persons or property.

3. Any facilities that constitute water obstructions (e.g. culverts, bridges, outfalls, or storm enclosures), as described in PA DER Chapter 105 regulations (as amended or replaced from time to time by PA DER), shall be designed in accordance with Chapter 105 and will require a permit from PA DER. Any other drainage conveyance facility that does not fall under Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm with a minimum of 1.0 foot of freeboard measured below the lowest point along the top of the roadway. Roadway crossings located within designated flood plain areas must be able to convey runoff from a 100-year design storm with a minimum 1.1 foot of freeboard measured below the lowest point along the top of the roadway. Any facility that constitutes a dam as defined in PA DER Chapter 105 regulations may require a permit under dam safety regulations. Any facility located within a PA DOT right-of-way must meet PA DOT minimum design standards and permit submission requirements.

4. Storm sewers must be able to convey post-development runoff from a 25-year design storm without surcharging inlets.

F. Single Release Rate - For a proposed development site located within only one release rate category area, the total runoff from the site shall meet the applicable release rate criteria. For development sites with multiple points of concentrated runoff discharge, individual drainage points may be designed for up to a one-hundred (100) percent release rate so long as the total runoff from the site is controlled to the applicable release rate.

G. Multiple Release Rates - For a proposed development site located within two or more release rate category areas, the maximum peak rate of runoff that may be discharged at any point is limited to the predevelopment peak rate of runoff at that point multiplied by the applicable release rate. The control rates shall apply regardless of any grading modifications which may change the drainage area which discharges at a given point.

H. "No Detention" Area - For proposed development sites located partially within a release rate category area and partially within a provisional no detention area, in no event shall a significant portion of the site area subject to the release rate control be drained to the discharge point(s) located in the detention area.

I. Regional or Sub-Regional Detention Alternatives - For certain areas within the watershed, it may be more cost-effective to provide one control facility for an entire subarea, group of subareas, or portion of a subarea incorporating more than one development site than to provide an individual control facility for each development site. The initiative and funding for any regional or sub-regional runoff control alternatives are the responsibility of prospective developers. The design of any regional control basins shall incorporate reasonable development of the entire upstream watershed. The peak outflow of a regional basin shall be determined on a case-by-case basis using the hydrologic model of the watershed consistent with protection of the downstream watershed areas. "Hydrologic

model" refers to the calibrated Lackawanna River version of the Penn State Runoff Model as developed for the Storm Water Management Plan.

J. Capacity Improvements - In certain instances, primarily within the provisional no detention areas, local drainage conditions may dictate more stringent levels of runoff control than those based upon protection of the entire watershed. In these instances, if the developer proves to the satisfaction of the Township that it would be feasible to provide capacity improvements to relieve the capacity deficiency in the local drainage network, the Township may permit the developer to provide capacity improvements in lieu of runoff controls on the development site. Any such capacity improvements shall be designed based upon development of all areas tributary to the proposed improvements and the capacity criteria specified in Section 303.2,F of this Ordinance. In addition, all new development upstream of a proposed capacity improvement shall be assumed to implement the applicable runoff controls consistent with this Ordinance except that all new development within the subareas(s) within the proposed development site is located shall be assumed to implement the developer's proposed discharge control, if any.

The Township may also permit the developer to provide capacity improvements may also be provided as necessary to implement any regional or subregional detention alternatives or to implement a modified "no harm" option which proposes specific capacity improvements to document the validity of a less stringent discharge control which would not create any harm downstream.

SECTION 303. METHODS OF CALCULATION OF RUNOFF FLOW PARAMETERS

SECTION 303.1 WALLENPAUPACK CREEK WATERSHED COMPUTATION METHODS

A. Computation Methods - The Methods of computation used to determine peak discharge and volume of runoff shall be one of the following four (4) methods or any other method approved by Jefferson Township in advance:

1. The USDA SCS Soil-Cover-Complex Method as set forth in the latest edition of "Urban Hydrology For Small Watersheds", Technical Release No. 55.

2. The USDA SCS Soil-Cover-Complex Method as set forth in the "TR-20 Computer Program for Project Formulation Hydrology", Technical Release No. 20.

3. The Penn State Runoff Model (PSRM) as set forth in the Penn State Runoff User's Manual, January 1987 Version.

4. The "Rational Method" of Q=CIA, where Q is the peak discharge from the watershed in cubic feet per second (cfs), C is the coefficient of runoff, I is the intensity of rainfall in inches per hour and A is the area of the watershed in acres.

B. Hydrographic Method - Where the drainage basin exceeds 200 acres or where a detention/retention facility is involved, a hydrographic method shall be used for design purposes. The method of computation shall be selected using the following guidelines:

Output Requirements	Hydrologic Computation Drainage Area	To Be Used
Peak Discharge Only	Up to 200 Acres	Rational Method, TR-55, TR-20, or PSRM
	Up to 20 sq. mi.	TR-55, TR-20, or PSRM
	Above 20 sq. mi.	TR-20 or PSRM
Peak Discharge and Total Runoff Volume	Up to 20 sq. mi.	TR-55, TR-20, or PSRM
	Above 20 sq. mi.	TR-20 or PSRM
Runoff Hydrograph	Up to 20 sq. mi.	TR-55, TR-20, or PSRM
	Above 20 sq. mi.	TR-20 or PSRM

C. Rainfall Frequency - Rainfall frequency data to be used depends on the method of computation selected.

1. When the SCS Soil-Cover-Complex Method is used, storm runoff shall be based on the most recent DER Rainfall Duration Frequency Table for Pennsylvania.

2. When the Rational Method is used, the Region 4 or Region 5 Rainfall Intensity-Duration-Frequency chart shown in the most current PA DOT Design Manual, Part 2, shall be used to determine the rainfall intensity in inches per hour. The charts are shown on Figures 2.10.4.2(D) and 2.10.4.2(E) of the manual and in Appendix B.3 of the Ordinance should be used to determine if Region 4 or Region 5 curves are to be used.

D. Runoff Curve Number - Runoff Curve Numbers (CN's) to be used in the Soil Cover Complex shall be based upon the matrix presented in Appendix B.4 of this Ordinance. Appendix B.8 is a copy of a worksheet that can be used in estimating a subwatershed's composite runoff curve number.

E. Time of Travel - Time of Travel (Tt) estimates for overland flows shall be based on the average velocities determined using the chart presented in Appendix B.5 of this Ordinance. Appendix B.9 is a copy of a work-sheet that can be used in estimating a subwatershed's total Time of Concentration or Time of Travel.

F. Runoff Coefficients - Runoff coefficients for use in the Rational Method shall be based upon the table presented in Appendix B.6 of this Ordinance.

G. Manning Equation - The Manning Equation shall be used to calculate the capacity and velocity of flow in open channels and in closed drains not under pressure. Manning "n" values used in the calculations shall be consistent with the table presented in Appendix B.7 of this Ordinance.

H. Calculations - All runoff calculations shall include both a hydrologic and hydraulic analysis indicating: 1) rate and velocities of flow; 2) grades, dimensions, and capacities of water

carrying structures and impoundment structures; and 3) sufficient design information to construct such stormwater management facilities. Runoff calculations shall include both pre-development and post-development rates of peak discharge and volumes of storm runoff from the project development site. Runoff calculations for the site's condition during development shall be used to size temporary control measures.

SECTION 303.2 LACKAWANNA RIVER WATERSHED COMPUTATION METHODS

A. Calculation Methods - Storm water runoff from all development sites shall be calculated using a method acceptable to the review agency, either the Rational Method or a Soil-covered Complex Methodology.

B. Detention Basins - The design of any detention basin intended to meet the requirements of this Ordinance shall be verified by routing the design storm hydrograph through the proposed basin. For basins designed using the modified rational method technique, the detention volume shall, at minimum, equal the volume derived from the approximate routing process as contained in SCS Technical Release Number 55 (TR55, 1986), Chapter 6 (Figure 6-1).

C. Rainfall Criteria - All calculations using the soil-cover-complex method shall use the Soil Conservation Service Type II 24-hour rainfall distribution. The 24-hour rainfall amounts for the various return periods shall be taken from the PennDOT Intensity- Duration - Frequency Field Manual (May 1986) for all stormwater calculations prepared for compliance with this Ordinance.

D. Rational Method - All calculations using the Rational Method shall use rainfall intensity consistent with appropriate times of concentration and return periods and the Intensity - Duration - Frequency Curves as presented in the Lackawanna River Watershed Plan Appendix.

E. Soil Cover Complex Method - Runoff Curve Numbers (CN's) to be used in the soil-cover-complex method shall be based upon the matrix presented in the Lackawanna River Watershed Plan Appendix.

F. Runoff Coefficients - Runoff coefficients for use in the Rational Method shall be based upon the table presented in the Lackawanna River Watershed Plan Appendix.

G. Watercourse Capacity - The Manning Equation shall be used to calculate the capacity of watercourses. Manning "n" values used in the calculations shall be consistent with the table presented in the Lackawanna River Watershed Plan Appendix. Pipe capacities shall be determined by methods acceptable to the municipal engineer.

H. Dam Safety Permit - Any detention basin, or other structure, intended to meet the requirements of this Ordinance which requires a Dam Safety Permit from DER shall be designed in accord with the provisions of the Dam Safety and Encroachments Act and the DER Chapter 105 Rules and regulations.

ARTICLE IV
DRAINAGE PLAN REQUIREMENTS

SECTION 401. GENERAL REQUIREMENTS

Prior to the final approval of subdivision and/or land development plans, the issuance of any permit, or the commencement of any land disturbance activity involving any of the Regulated Activities of the Ordinance, the owner, subdivider, developer or his agent shall submit a Drainage Plan to the Township for approval. The plan shall meet the requirements set forth herein, and shall also meet all requirements of Title 25 Rules and Regulations of the PA DER-Chapter 102 (Erosion Control), Chapter 105 (Dam Safety and Waterway Management), and Chapter 106 (Flood Plain Management).

SECTION 402. EXEMPTIONS

This Section 402 defines those activities which are exempt from the Drainage Plan preparation provisions and the permit requirements of this Ordinance. Nevertheless, activities exempted from plan preparation provisions and permit requirements must provide for the control of soil erosion and sedimentation and for the management of stormwater as required by the other provisions of this Ordinance. No exemption shall be provided for Regulated Activities as defined in Section 104,C,8 and 104,C,9 of this Ordinance.

Failure by the developer and/or landowner to provide said erosion and sedimentation control or stormwater management, or failure to submit the required Drainage Plan and obtain a permit when the exemption thresholds established in this Section 402 are exceeded, shall constitute a violation of this Ordinance and said violation shall be subject to the enforcement procedures and penalties prescribed in this Ordinance.

SECTION 402.1 WALLENPAUPACK CREEK WATERSHED EXEMPTIONS

A. Residential Land Disturbance Exemption

Any land disturbance, or construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc.), or activity associated with or accessory to an existing or proposed single family residential dwelling to be used as the developer's (i.e. homeowner's) residence or with land used for gardening for home consumption or landscaping is exempt from the Drainage Plan preparation provisions and permit requirements of this Ordinance. Nevertheless, any such land disturbance associated with the construction, alteration or addition to a single family residence and associated improvements shall be provided with adequate soil erosion and sedimentation controls, as prescribed by the County Conservation District.

However, for any land disturbance activity associated with a residence, as regulated by this Subsection A, which involves the disturbance of more than sixty thousan (60,000) square feet

of area, or which is undertaken within fifty (50) feet of any stream or waterbody, or where the slope of the disturbed area exceeds fifteen (15) percent, a soil erosion and sedimentation control plan for the parcel shall be submitted with the application for a building permit which shall be required in such case.

B. Non-Residential Land Disturbance Exemption

Any non-residential Regulated Activity within the Wallenpaupack Creek Watershed which would create ten-thousand (10,000) square feet or less of additional impervious cover is exempt from the Drainage Plan preparation provisions and permit requirements of this Ordinance. This criteria shall apply to the total proposed development even if development is to take place in stages (i.e. the impervious cover associated with the total development shall be used for the determination of qualification for an exemption, not merely the individual stage impervious cover). Additional impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks constructed as part of or for the proposed Regulated Activity. Any areas designed to initially be gravel, crushed stone, porous pavement, etc. shall be assumed to be impervious for the purposes of determination of an exemption.

C. Agricultural Operations Exemption

Any land disturbance associated with agricultural activities operated in accordance with a Conservation Plan or a Soil Erosion and Sedimentation Control Plan approved by the Conservation District is exempt from the Drainage Plan preparation provisions and permit requirements of this Ordinance.

D. Forest Management and Nursery Operations Exemption

Any land disturbance associated with any forest management and nursery operations which is following the PA DER's management practices contained in DER publication "Soil Erosion and Sedimentation Control Guidelines for Forestry" and is operating under a Conservation District approved Soil Erosion and Sedimentation Control Plan and Forest Management Plan is exempt from the Drainage Plan preparation provisions and permit requirements of this Ordinance.

SECTION 402.2 LACKAWANNA RIVER WATERSHED EXEMPTIONS

A. Additional Impervious Cover Less Than 10,000 Square Feet

Any Regulated Activity within the Lackawanna River Watershed which would create ten-thousand (10,000) square feet or less of additional impervious cover is exempt from the Drainage Plan preparation provisions and permit requirements of this Ordinance. This criteria shall apply to the total proposed development even if development is to take place in stages (i.e. the impervious cover associated with the total development shall be used for the determination of qualification for an exemption, not merely the individual stage impervious cover). Additional impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks constructed as part of or

for the proposed Regulated Activity. Any areas designed to initially be gravel, crushed stone, porous pavement, etc. shall be assumed to be impervious for the purposes of determination of an exemption.

B. Agricultural Operations Exemption

Any land disturbance associated with agricultural activities operated in accordance with a Conservation Plan or a Soil Erosion and Sedimentation Control Plan approved by the Conservation District is exempt from the Drainage Plan preparation provisions and permit requirements of this Ordinance.

C. Forest Management and Nursery Operations Exemption

Any land disturbance associated with any forest management and nursery operations which is following the PA DER's management practices contained in DER publication "Soil Erosion and Sedimentation Control Guidelines for Forestry" and is operating under a Conservation District approved Soil Erosion and Sedimentation Control Plan and Forest Management Plan is exempt from the Drainage Plan preparation provisions and permit requirements of this Ordinance.

SECTION 403. PLAN CONTENTS

The information set forth in this Section shall be included in the Drainage Plan as appropriate for the subject regulated activities. In cases where the regulated activity is governed by another Ordinance of the Township which requires the submission of development and/or construction plans or drawings, the information required by this Section 403 may be included therewith, provided that the plans, drawings and other information submitted contain all information required by the Township to make the determination of compliance with this and the other applicable Ordinance(s). The Township shall in any case have the right to require any additional information or a level of detail as needed to determine compliance with this Ordinance.

A. Narrative Report and Plans including the following information:

1. Description of project including:
    a. General description of project
    b. General description of stormwater controls
    c. General description of erosion control
    d. General description of sedimentation control
    e. Date project is to begin and expected date final stabilization will be completed
    f. Training and experience of person preparing the plan
2. The soils on site described as follows:
    a. Type may be specified as in a soil survey or by name, depth, slope, texture and structure
    b. Hydrologic soil group for each soil type
    c. Erodibility factor for each soil type

3. The amount of runoff from the project area and the upstream watershed area including:

   a. Method of calculation used (i.e. TR55, rational, etc...)
   b. Description of each sub-area
   c. Pre-development runoff for each area
   d. Post development runoff for each area
   e. Discussion of the effect of development and proposed method controlling run-off, detention basin, infiltration, etc.

4. The staging of earthmoving activities including:

   a. Cover removal
   b. Control facility installation and temporary controls used.
   c. Installation of improvements and permanent control measures.
   d. Schedule of operations, stabilization, clean-up, and disposal.

5. Temporary control measures and facilities for use during earthmoving as follows:

   a. Types of measures and facilities
   b. Purpose of each measure and facility
   c. Location of measures and facilities
   d. Design considerations and calculations, if any

6. Permanent control measures and facilities for site restoration and long-term protection including:
   a. Types of measures and facilities
   b. Purpose of each
   c. Location of measures and facilities
   d. Design considerations and calculations, if any.

7. General description of an ownership and maintenance program that clearly sets forth, to the satisfaction of the Township, the ownership and maintenance responsibility of all temporary and permanent stormwater management facilities and erosion and sedimentation control facilities, including:

   a. Description of temporary and permanent maintenance requirements
   b. Identification of a responsible individual, corporation, association or other entity for ownership and maintenance of both temporary and permanent stormwater management and erosion and sedimentation control facilities.
   c. Establishment of required easements for access to all facilities.
   d. Deed covenants and restrictions shall be submitted for approval by the Township to provide for maintenance of stormwater facilities by property owner or owner's association.

B. Plans, showing the following information:

   1. General

a. All plans shall be on sheet sizes and at a scale consistent with the Township Subdivision and Land Development Ordinance.
b. Proposed name or identifying title of project.
c. Name and address of the landowner and developer of the project site.
d. Plan date and date of the latest revision to the plan, north point, graphic scale and written scale. All plans shall be at a scale of ten (10), twenty (20), forty (40), fifty (50), or one hundred (100) feet to the inch.
e. Total acreage and boundary lines of the tract of land on which the project site is located.
f. A location map, for the purpose of locating the project site to be developed, at a minimum scale of two thousand (2,000) feet to the inch, showing the relation of the tract to adjoining property and to all highways, streets, Township boundaries, and other identifiable landmarks existing within one thousand (1,000) feet of any part of the tract of land on which the project site is proposed to be developed.
g. Certificate for approval by the Township's Board of Supervisors.
h. Certificate for review by the Township's Planning Commission.
i. Certificate for review by the Township's Engineer, if required by the Board of Supervisors.

2. Existing Features

a. Tract boundaries showing distances, bearings and curve data, as located by field survey or by deed plotting in accord with the standards in the Township Subdivision and Land Development Ordinance.

b. Existing contours at vertical intervals of two (2) feet for land with an average natural slope of fifteen (15%) percent or less and at vertical intervals of five(5) feet for more steeply sloping land; except that for residential and agricultural uses where a preliminary subdivision or land development plan is not required by the Township's Subdivision and Land Development Ordinance, no contours shall be required; however, the plan should indicate the natural drainage patterns of the site along with the approximate grades of all slopes. Where contours are shown, the location of the benchmark and the name of the datum shall also be indicated.

c. The names of all owners of all immediately adjacent unplotted land, the names of all proposed or existing developments immediately adjacent, and the locations and dimensions of any streets or easements shown thereon.

d. The names, locations and dimensions of all existing highways, streets, railroads, watercourses and bodies of water, drainage facilities, floodplains, and other significant features within [two hundred (200)] feet of any part of the buildings and approximate location of all tree masses within the tract.

e. Locations and dimensions of overhead and underground utilities, sewers, and water lines.

f. Boundaries and identification of soil types as designated by the USDA SCS Soil Survey of Lackawanna County.

3. Proposed Features

a. The proposed land use, the number of lots and dwelling units and the extent of commercial, industrial or other non-residential uses.

b. The locations and dimensions of all proposed streets, parks, playgrounds, and other public areas; overhead and underground utilities and sewer and water facilities; lot lines and building locations, and parking compounds and other impervious and semi-pervious surfaces.

c. The proposed changes to land surface and vegetative cover.

d. Areas of cuts or fills.

e. Final contours at vertical intervals of two (2) feet for land with an average natural slope of fifteen (15%) percent or less and at vertical intervals of five (5) feet for more steeply sloping land. Where existing contours are not shown or where proposed contour lines cannot be accurately located (i.e., as in a single family detached residential development when the building has not been determined), arrows indicating general surface runoff flow patterns shall be shown.

f. A twenty (20) foot right-of-way around all stormwater management structures and from such structures to a public right-of-way except for stormwater structures which by design must be located near buildings to protect said building or carry stormwater away from the building.

4. Stormwater Management Facilities

a. Subwatershed boundaries as defined in Section 302 and applicable to the development site.

b. All storm sewers along with any proposed connections to existing facilities.

c. Groundwater recharge methods such as seepage pits, beds or trenches. When these structures are used, the locations of septic tank infiltration areas and wells must be shown.

d. Other control devices or methods such as roof-top storage, grass swales, parking lot ponding, vegetated strips, and detention or retention basins.

e. Plans and profiles of all proposed stormwater management facilities including vertical and horizontal alignment, size and type of material. This information shall be of the quality required for the construction of all facilities.

f. A certificate, signed and sealed by the qualified individual who prepared the plan and designed facilities.

5. Erosion and Sedimentation Controls

a. The type, location and extent of all erosion and sedimentation control measures shall be shown on an erosion and sedimentation control plan that conforms to the requirements of Chapter 102 (Erosion Control) of Title 25 Rules and Regulations of the PA DER.

C. Financial security for the completion of stormwater management facilities as set forth in Article VII of this Ordinance.

D. Maintenance guarantee, as set forth in Article VII of this Ordinance.

E. When a Drainage Plan is submitted in sections, a generalized drainage plan for the entire project site shall be submitted in addition to the detailed drainage plan for the proposed section. This generalized plan shall demonstrate how the stormwater of the proposed section will relate to the entire development. The amount and velocity at the discharge point of the section shall be included in the data submitted. If temporary facilities are required for construction of a section, such facilities shall be included in the submitted Drainage Plan.

SECTION 404. PLAN SUBMISSION, APPROVALS, AND PERMITS

In cases where the regulated activity requires Township approval in accord with another Township Ordinance, the plans containing all information required by this Stormwater Management Ordinance, and facilities installation and construction required by this Ordinance shall, in addition to the requirements of this Ordinance be submitted, processed and conducted in accord with the procedures, including the number of copies to be submitted, required by the other governing Township Ordinance.

A. The regulated activities listed below shall be processed in accord with and shall be subject to the provisions of the Township Subdivision and Land Development Ordinance.

1. Land Developments
2. Subdivisions

B. The regulated activities listed below shall require a permit pursuant to the Township Zoning Ordinance and shall be processed in accord with said Ordinance with respect to plan submittal and permit issuance.

1. General land disturbance activities, including clearing, filling and excavating
2. Agricultural Operations
3. Construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc...)

4. Construction of new buildings and structures or additions to existing buildings and structures not regulated as land developments by the Township Subdivision Ordinance.
5. Forest management operations and nursery operations.
6. Diversion or piping of any natural or man-made drainage channel.
7. Installation of stormwater systems or appurtenances thereto.

C. The Drainage Plan shall be accompanied by the requisite fee, as required by Article VI of this Ordinance.

D. The Township Board of Supervisors may conduct a public hearing on any stormwater management plan application if deemed necessary by the Board. Public hearings shall be conducted in accord with the Pennsylvania Municipalities Planning Code requirements for public hearings.

E. For Regulated Activities specified in Section 104,C,8 (Diversion or piping of any natural or man-made stream channel) and 104,C,9 (Installation of storm water systems or appurtenances thereto), the Drainage Plan shall be submitted to the county planning agency and the county planning agency shall notify DER whether the Drainage Plan is consistent with the Storm Water Management Plan and forward a copy of the review letter to the Township, developer and any other interested party(ies).

F. The Township shall not approve any subdivision or land development (regulated Activities 104,C,1 and 104,C,2) or zoning permit application (Regulated Activities 104,C,3; 104,C,4; 104,C,5; 104,C,6; 104,C,7; 104,C,8; or 104,C,9) if the Drainage Plan has been found to be inconsistent with the Storm Water Management Plan as determined by the Township Engineer. The Township shall provide the developer with a written approval or denial of the proposal in accord with the notice requirements established by the Subdivision and Land Development Ordinance or Zoning Ordinance, as applicable.

G. The Township shall maintain a record of the approved plan and all accompanying documentation at the Township office.

SECTION 405. MODIFICATION OF PLANS

A modification to an approved Drainage Plan which involves a change in control methods or techniques, or which involves the relocation or redesign of control measures, or which is necessary because soil or other conditions are not as stated on the approved plan application, as determined by the Township, shall require a resubmission of the modified Drainage Plan consistent with Section 404 of this Ordinance.

ARTICLE V
INSPECTIONS

SECTION 501. GENERAL REQUIREMENTS

A. Prior to the initiation of the construction of stormwater management facilities as shown on of the approved Drainage Plan, the developer shall provide to the Township for approval a schedule of inspections including the provision of a final inspection and submission of "as-built" drawings to the Township. These inspection provisions pertain only to construction activities regulated by the plan preparation provisions of Article IV. However, any activities granted exemption from plan preparation provisions as described in Section 402 and Article IX, which are therefore exempt from the inspection provisions, shall nevertheless control erosion and manage stormwater in the manner required by this Ordinance.

SECTION 502. SCHEDULE OF INSPECTIONS

A. The Township Enforcement Officer shall inspect all phases of development of the site including, but not limited to:

1. Completion of preliminary site preparation including stripping of vegetation, stockpiling of topsoil, and construction of temporary stormwater management and erosion control facilities.

2. Completion of rough grading, prior to placing top soil, permanent drainage or other site development improvements and ground covers.

3. During construction and installation of the permanent storm water facilities at such times to be specified by the Township.

4. Upon completion of permanent stormwater management facilities, including established ground covers and plantings.

5. Upon completion of any final grading, vegetative control measures or other site restoration work done in accordance with the approved Drainage Plan.

B. No work shall begin on a subsequent stage until the proceeding stage has been inspected and approved by the Township Enforcement Officer.

C. It is the responsibility of the developer to notify the Township Enforcement Officer not less than forty-eight (48) hours in advance of the completion of each identified phase of development.

D. In the event the Township Enforcement Officer discovers that the work does not comply with the approved Drainage Plan or any applicable laws and ordinances, the Enforcement Officer shall issue a stop work order and the developer shall cease all work until the required corrections are made. Any portion of the work that does not comply with the

approved plan must be corrected by the developer within ten (10) days. No work may proceed on any subsequent phase of the Drainage Plan, the subdivision or land development or building construction or other regulated activity until the required corrections have been made.

E. If at any stage of the work, the Township Enforcement Officer determines that the soil or other conditions are not as stated or shown in the approved Drainage Plan, the Enforcement Officer may refuse to approve further work and the Township may revoke approvals until a revised Drainage Plan is submitted and approved, as required by Section 405 of this Ordinance. If the revised Drainage Plan cannot remedy the situation then the Township shall have the right to revoke the Township approval and halt all work except for that work required to "close-out" the activity and return the site to pre-activity conditions as much as is reasonably possible.

F. If the Township discovers that the facilities or measures installed may be in violation of Chapter 102 (Erosion Control) of the Clean Streams Law, the Township shall refer these violations to the appropriate conservation district.

SECTION 503. FINAL INSPECTION

When the developer has completed all the required facilities, he shall notify the Township in writing by certified or registered mail, and shall send a copy of such notice to the Township Engineer. The developer shall submit therewith a certification by a Qualified Individual; which certifies that all elements of the approved Drainage Plan have been constructed as designed and shown on the approved Plan. Following the final inspection, the Enforcement Officer conducting the inspection for the Township shall promptly file a report, in writing, with the Township and shall mail a copy of the report to the developer by certified or registered mail. The report shall be made and mailed within forty-five (45) days after receipt by the Township of the aforesaid developer notice of facilities completion. The final determination of compliance with this ordinance and the approved plans shall be made by the Township Board of Supervisors.

SECTION 504. AS-BUILTS

Following final inspection, the developer shall submit drawings bearing the seal of a Qualified Individual indicating the "As-Built" improvements called for in the approved plan.

ARTICLE VI
FEES AND EXPENSES

SECTION 601. GENERAL

A fee covering costs incurred by the Township for Drainage Plan review and inspections and other administrative functions required by this Ordinance shall be established by resolution of the Board of Supervisors. No approval of the Drainage Plan shall be issued until the requisite fee has been paid.

The fees payable by an applicant shall include but not be limited to:

A. The review of the Drainage Plan by the Township as required in Section 404 of this Ordinance.

B. The site inspection.

C. The inspection of required controls and improvements during construction as presented in Article V of this Ordinance.

D. The final inspection upon completion of the controls and improvements required in the plan as presented in Article V of this Ordinance.

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

F. Any other fees for consulting services required by the Township for the review and administration of regulated activities.

SECTION 602. MODIFICATION OF PLANS

If it is determined that modification to the existing Drainage Plan is required under Section 405 of this Ordinance additional fees shall be assessed to cover the additional costs incurred by the Township for processing the revised Drainage Plan. The revised plan shall not be approved until the additional fee has been paid by the applicant.

ARTICLE VII
FACILITIES CONSTRUCTION AND MAINTENANCE

SECTION 701. SOIL EROSION AND SEDIMENTATION AND TEMPORARY STORMWATER FACILITIES

Prior to the initiation of preliminary site preparation for any regulated activity, the soil erosion and sedimentation control practices and any temporary stormwater management facilities as shown on the approved Drainage Plan, shall be installed in accord with said Plan. It shall be the responsibility of the Developer to maintain said control practices throughout the period of construction until such time as the site has been stabilized and all permanent controls have been installed and are approved in accord with this Ordinance. Failure of the Developer to comply with this Section 701 shall constitute a violation of this Ordinance which shall be subject to the penalties prescribed by said Ordinance.

SECTION 702. SUBDIVISIONS AND LAND DEVELOPMENTS

In the case where soil erosion and sedimentation control practices and stormwater management facilities are required for a regulated activity governed by Section 404, Subsection A, of this Ordinance and the Township Subdivision Ordinance (i.e. a subdivision or land development) said practices and facilities shall be considered to be improvements as defined by the Township Subdivision Ordinance and shall be installed and maintained in accord with the provisions of the Township Subdivision Ordinance in addition to any other applicable requirements of this Stormwater Management Ordinance. Failure to install and maintain said practices and facilities shall be considered a violation of this Ordinance and the subdivision approval for same may be revoked by the Township.

SECTION 703. OTHER REGULATED ACTIVITIES

In the case where erosion and sedimentation control practices and stormwater management facilities are required for a regulated activity governed by Section 404, B of this Ordinance and the Township Zoning Ordinance (i.e. regulated activities which are not subdivisions or land developments) the installation and maintenance of said practices and facilities shall be considered a "condition of approval" attached to the zoning approval of the subject regulated activity. Failure to install and maintain said practices and facilities shall be considered a violation of this Ordinance and the Zoning Ordinance and the approval and permits for same may be revoked by the Township.

Pursuant to the authority of the Pennsylvania Stormwater Management Act, the Township may require the applicant to provide to the Township financial security to guarantee the installation and maintenance for any or all required practices and facilities. If a financial guarantee is required, said guarantee shall be provided and all practices and facilities shall be installed and maintained in accord with the Township Subdivision Ordinance and all applicable provisions of the Pennsylvania Municipalities Planning Code.

The Township may also attach as a condition of approval a time limit for the completion of said practices and facilities.

SECTION 704. REMEDIES TO EFFECT COMPLETION AND MAINTENANCE OF FACILITIES

In the event that any stormwater management facilities which may be required have not been installed or maintained as provided in this Ordinance or in accordance with the approved final plan, the Township shall have the power to enforce any corporate bond or other security by appropriate legal and equitable remedies. If proceeds of any such bond or other security are insufficient to pay the cost of installing, maintaining or making repairs or corrections to all the facilities covered by said security, the Township shall have the authority to require the responsible entity to install, maintain, repair or correct such facilities. The Township may, at its option, install, maintain, repair or correct all or part of such facilities in all or part of the development and may institute appropriate legal or equitable action to recover the monies necessary to complete the remainder of the facilities. All of the proceeds, whether resulting from the security or from any legal or equitable action brought against the developer, or both, shall be used solely for the installation of the stormwater management facilities covered by such security, and not for any other purpose.

SECTION 705. MAINTENANCE RESPONSIBILITIES

The maintenance responsibilities for permanent stormwater management facilities shall be determined based upon the type of ownership of the property and/or facilities.
The failure of any person, individual lot owner or private entity to properly maintain any stormwater management facility shall be construed to be a violation of this Ordinance and the Township Subdivision and Land Development Ordinance or Zoning Ordinance, as the case may be; and is hereby declared to be a violation and public nuisance, subject to Article VIII, Enforcement and Penalties of this Ordinance.

705.1 Maintenance by Private Entity

When a private entity (such as a homeowner's association) retains ownership of any stormwater management facility, such entity shall be responsible for maintenance of the facility. The stated responsibilities of the entity in terms of owning and maintaining the facilities shall be submitted with the Drainage Plan for determination of their adequacy. Approval of the Drainage Plan shall be in writing, shall be in recordable form, and shall, in addition to any other terms deemed necessary by the Township, contain a provision permitting inspection at any reasonable time by the Township, or its designee of all such facilities deemed critical in the public welfare.

705.2 Maintenance by Individual Lot Owners

When any stormwater management facility is located on an individual lot, and when maintenance thereof is the responsibility of that landowner, a description of the facility or systems and the terms of the required maintenance shall be incorporated as a part of the deed to the property. The deed shall be recorded with the County Recorder of Deeds within ninety (90) days following Township approval. In addition, the Township may require as a condition of approval that a deed conveying any interest in such lot contain language indicating that the conveyance is subject to an express covenant by the grantee that the grantee will maintain the stormwater management facility.

SECTION 706. MAINTENANCE GUARANTEES

Upon approval of any stormwater management facilities by the Township, the developer shall provide a financial security, in a form approved by the Township solicitor for maintenance guarantees, as follows:

A. Construction Maintenance Bond

The Township may require the posting of a maintenance bond to secure the structural integrity of said facilities as well as the functioning of said facilities in accordance with the design and specifications as depicted on the approved Drainage Plan for a term not to exceed eighteen (18) months from the date of acceptance of dedication. Said financial security shall be the same type as required with regard to installation of such facilities, and the amount of the financial security shall not exceed fifteen percent (15%) of the actual cost of installation of said facilities.

B. Long-term Maintenance Bond

The Township may also require a long-term maintenance guarantee for any facilities. Such guarantee shall be in an amount equal to the present worth of maintenance of the facilities for a ten (10) year period at current prime interest rate. The estimated annual maintenance cost for the facilities shall be based on a fee schedule provided by the Township Engineer and adopted by resolution of the Township Board of Supervisors.

C. Documentation

The terms of the maintenance guarantees shall be documented as part of the Drainage Plan as per Section 403.D of this Ordinance.

ARTICLE VIII
ENFORCEMENT AND PENALTIES

SECTION 801. ENFORCEMENT

The Township shall designate by resolution an individual, agency, or combination thereof to act as the Enforcement Officer, who shall have the authority and responsibility to enforce the regulations set forth in this Ordinance. In the event that the Enforcement Officer is unable to perform his duties, or in the event of a conflict of interest, the Township may appoint an alternate to fulfill his responsibilities.

SECTION 802. RIGHT-OF-ENTRY

Upon presentation of proper credentials, duly authorized representatives of the Township may enter at reasonable times upon any property within the Township to investigate or ascertain the condition of the subject property in regard to any aspect regulated by this Ordinance. This includes property housing stormwater management facilities for which the Township is not directly responsible for maintenance as provided in Article VII.

SECTION 803. VIOLATIONS

The following actions shall be considered violations of this Ordinance and shall be subject to the penalties prescribed herein:

A. The initiation of any regulated activity without first obtaining the required approvals and permits.

B. The failure to install or maintain any and all required soil erosion and sedimentation control practices; and any and all required stormwater management facilities.

C. The failure to abide by any other applicable provisions of this Ordinance.

SECTION 804. NOTICE, PENALTIES, REMEDIES, AND APPEALS

Notice of any violation, penalties prescribed for violations, remedies available to the Township, and appeals by the violator shall be governed by the applicable ordinances as follows:

A. Subdivisions and Land Developments as regulated by Section 404, Subsection A of this Ordinance shall be governed by the Township Subdivision Ordinance.

B. Other regulated activities as governed by Section 404, Subsection B of this Ordinance shall be governed by the Township Zoning Ordinance.

ARTICLE IX
WAIVERS

SECTION 901. HARDSHIP WAIVER PROCEDURE

A. The Township's Board of Supervisors may hear requests for waivers where it is alleged that the provisions of this Ordinance inflict unnecessary hardship upon the applicant. The waiver request shall be submitted to the Township Secretary in writing using an application form promulgated by the Township and accompanied by the requisite fee based upon a fee schedule adopted by resolution of the Township Board of Supervisors. A copy of the completed application form shall be provided to each of the following: Jefferson Township, Township Engineer, Township Solicitor, Township Planning Commission, and County Planning Commission. The application shall state in full the grounds and facts of unreasonableness or hardship on which the request is based, the provision or provisions of the Ordinance involved and the minimum waiver necessary.

B. The Township may grant a waiver of one or more provisions of this Ordinance provided that such waiver shall not be contrary to the public interest and that all of the following findings are made in a given case:

1. That there are unique physical circumstances or conditions, including irregularity of lot size or shape, or exception topographical or other physical conditions peculiar to the particular property, and that the unnecessary hardship is due to such conditions, and not the circumstances or conditions generally created by the provisions of this Ordinance;

2. That because of such physical circumstances or conditions, there is no possibility that the property can be developed in strict conformity with the provisions of this Ordinance, including the "no harm" provision documented in Section 301, and that the authorization of a waiver is therefore necessary to enable the reasonable use of the property;

3. That such unnecessary hardship has not been created by the applicant;

4. That the waiver, if authorized, will represent the minimum waiver that will afford relief and will represent the least modification possible of the regulation in issue.

C. In granting any waiver, the Township may attach such reasonable conditions and safeguards as it may deem necessary to implement the purposes of this Ordinance. The Township shall keep a record of all action on all requests for waivers.

D. No waiver shall be provided for Regulated Activities as defined in Section 104,C,8 and Section 104,C,9 of this Ordinance.

ARTICLE X
ENACTMENT

SECTION 1001. REPEALER

Any ordinance of the Township which is less stringent or less restrictive than any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

SECTION 1002. COMPATIBILITY WITH OTHER PERMIT AND ORDINANCE REQUIREMENTS

Approvals issued pursuant to this Ordinance do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act or ordinance. If more stringent requirements concerning regulation of stormwater or erosion and sedimentation control are contained in the other code, rule, act or ordinance, the more stringent regulation shall apply. Refer to Appendix A for a list of related regulations, codes, and ordinances. Appendix A is not a part of the Ordinance.

SECTION 1003. TOWNSHIP LIABILITY

The making of an administrative decision shall not constitute a representation, guarantee or warranty of any kind by the Township or by any official or employee thereof, of the practicability or safety of any proposed structure or use with respect to damage from erosion, sedimentation, storm water runoff or floods, and shall create no liability upon, or cause of action against, the Township, its officials or employees.

SECTION 1004. SEVERABILITY

If any section, subsection, or requirement of this Ordinance shall be held to be unconstitutional or invalid by any court of competent jurisdiction, such decision shall not affect the legality of the remaining provisions of this Ordinance or of this Ordinance as a whole.

SECTION 1005. AMENDMENTS

Amendments to this Ordinance may be initiated by the Township Planning Commission or the Board of Supervisors. If the amendments are initiated by the Board of Supervisors, the proposed amendment or amendments shall be submitted to the Planning Commission for review and comment at least thirty (30) days prior to a public hearing. Before enactment of a proposed amendment or amendments the Board of Supervisors shall hold a public hearing thereon pursuant to public notice.

SECTION 1006. EFFECTIVE DATE

This Ordinance shall become effective on September 7, 1993.

Ordained and enacted this 7th day of September, 1993.

Jefferson Township Board of Supervisors

Chairman

Vice-Chairman

Supervisor

ATTEST:

Secretary

JEFFERSON TOWNSHIP
LACKAWANNA COUNTY, PENNSYLVANIA

STORMWATER MANAGEMENT ORDINANCE
WALLENPAUPACK CREEK and
LACKAWANNA RIVER WATERSHEDS

APPENDIX

NOTE: THE APPENDIX MATERIAL FOR THE **WALLENPAUPACK CREEK WATERSHED** IS CONTAINED IN APPENDICES "B", "C", AND "D" WHICH FOLLOW.

NOTE: THE APPENDIX MATERIAL FOR THE **LACKAWANNA RIVER WATERSHED** IS CONTAINED IN THE LACKAWANNA RIVER WATERSHED STORMWATER MANAGEMENT PLAN APPENDICES ISSUED BY THE LACKAWANNA COUNTY REGIONAL PLANNING COMMISSION WHICH ARE INCORPORATED HEREIN BY REFERENCE.

APPENDIX A

LIST OF RELATED TOWNSHIP REGULATIONS, CODES, AND ORDINANCES

A.1 Subdivision/Land Development Ordinance

A.2 Zoning Ordinance

A.3 Floodplain Management Regulations

A.4 Building Permits

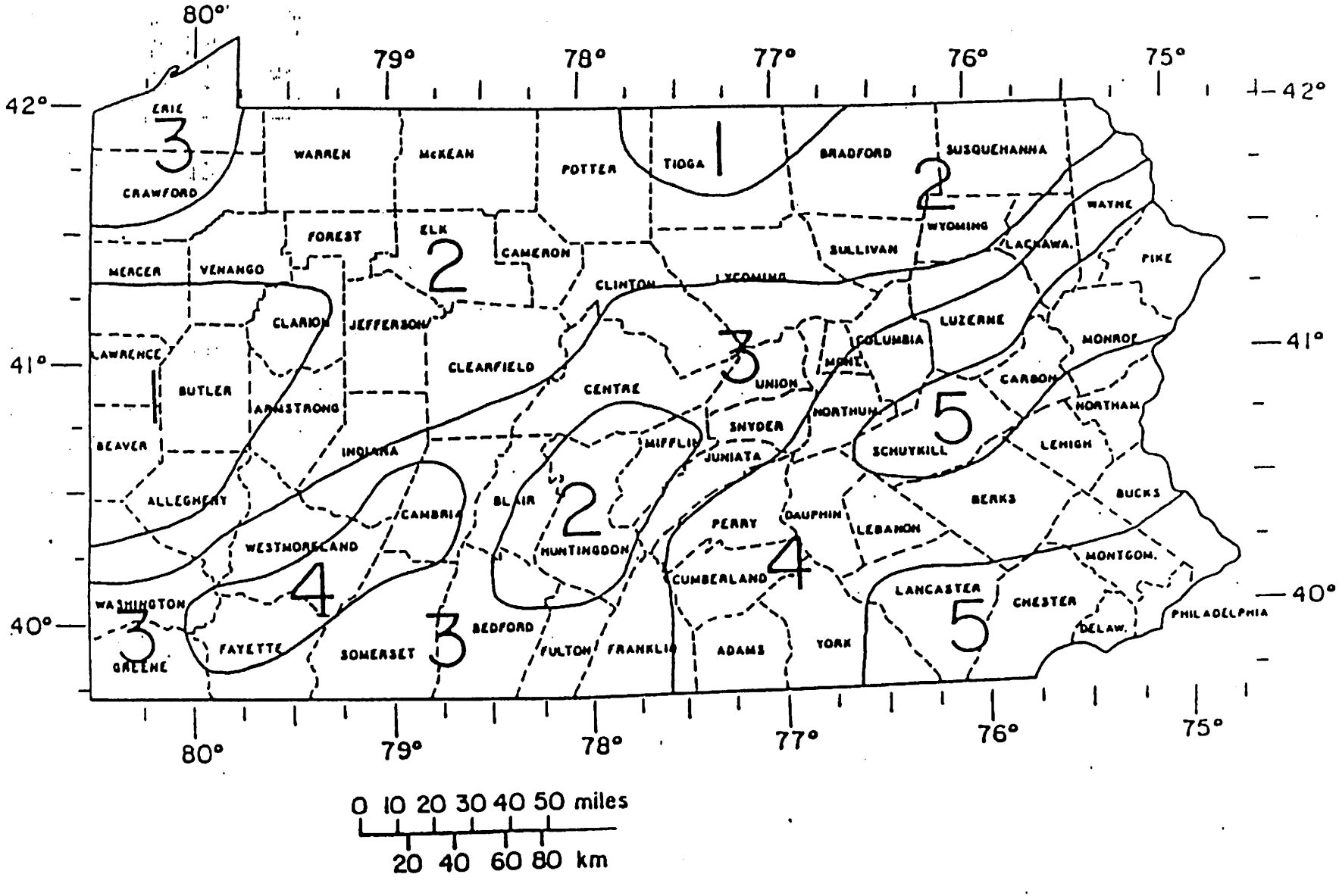
APPENDIX B

APPENDIX B.1

STANDARD SCS 24-HOUR, TYPE II DISTRIBUTION
CUMULATIVE RAINFALL TABLE
(REVISED MAY 1982)

Time Increment = 15 minutes (0.25 hour)

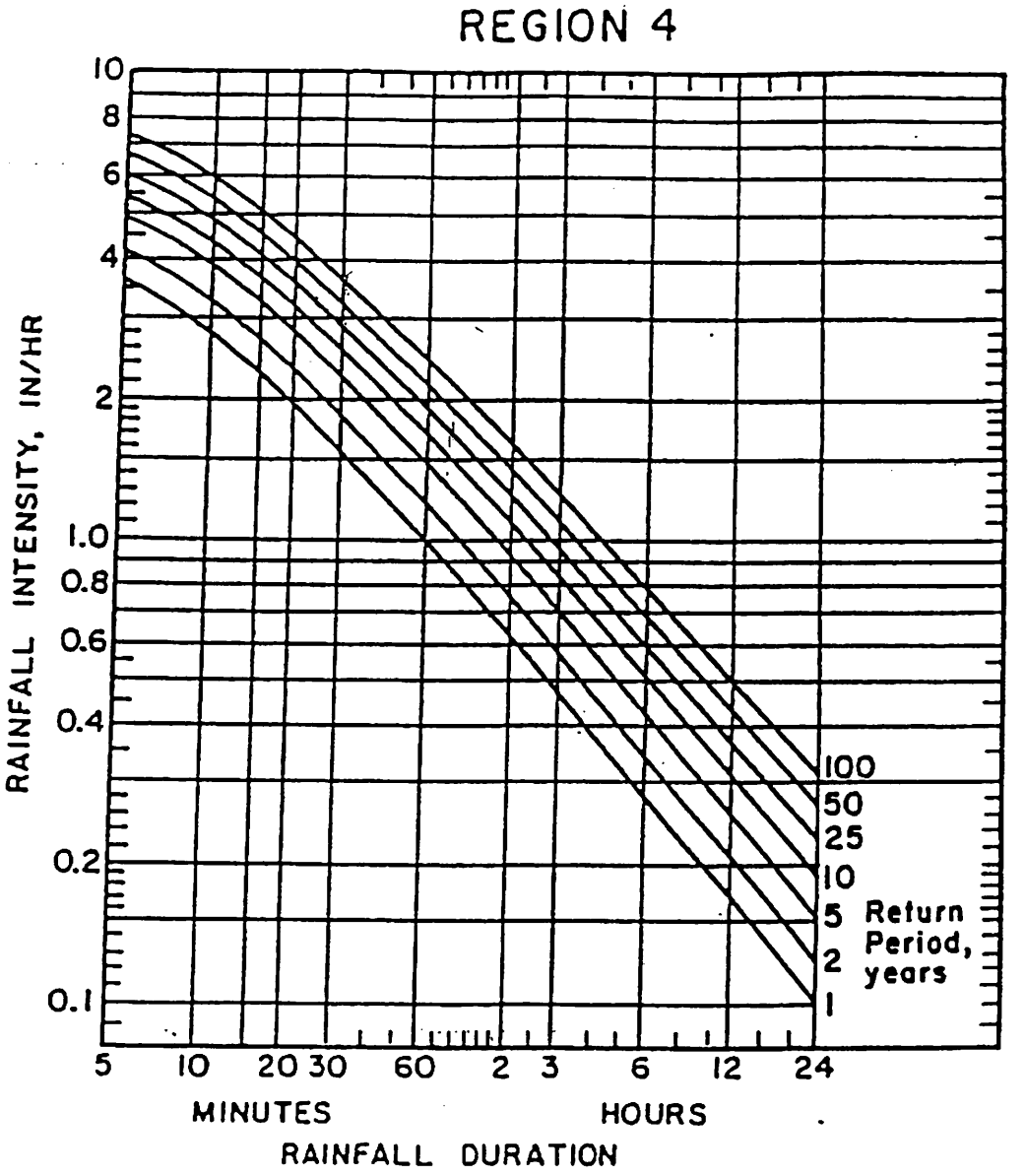
0.0	0.0020	0.0050	0.0080	0.01110
0.0140	0.0170	0.0200	0.0230	0.0260
0.0290	0.0320	0.0350	0.0380	0.0410
0.0440	0.0480	0.0520	0.0560	0.0600
0.0640	0.0680	0.0720	0.0760	0.0800
0.0850	0.0900	0.0950	0.1000	0.1050
0.1100	0.1150	0.1200	0.1260	0.1330
0.1400	0.1470	0.1550	0.1630	0.1720
0.1810	0.1910	0.2030	0.2180	0.2360
0.2570	0.2830	0.3870	0.6630	0.7070
0.7350	0.7580	0.7760	0.7910	0.8040
0.8150	0.8250	0.8340	0.8420	0.8490
0.8560	0.8630	0.8690	0.8750	0.8810
0.8870	0.8930	0.8980	0.9030	0.9080
0.9130	0.9180	0.9220	0.9260	0.9300
0.9340	0.9380	0.9420	0.9460	0.9500
0.9530	0.9560	0.9590	0.9620	0.9650
0.9680	0.9710	0.9740	0.9770	0.9800
0.9830	0.9860	0.9890	0.9920	0.9950
0.9980	1.0000	1.0000	1.0000	1.0000



Appendix B.2 Delineated Regions With Uniform Rainfall.

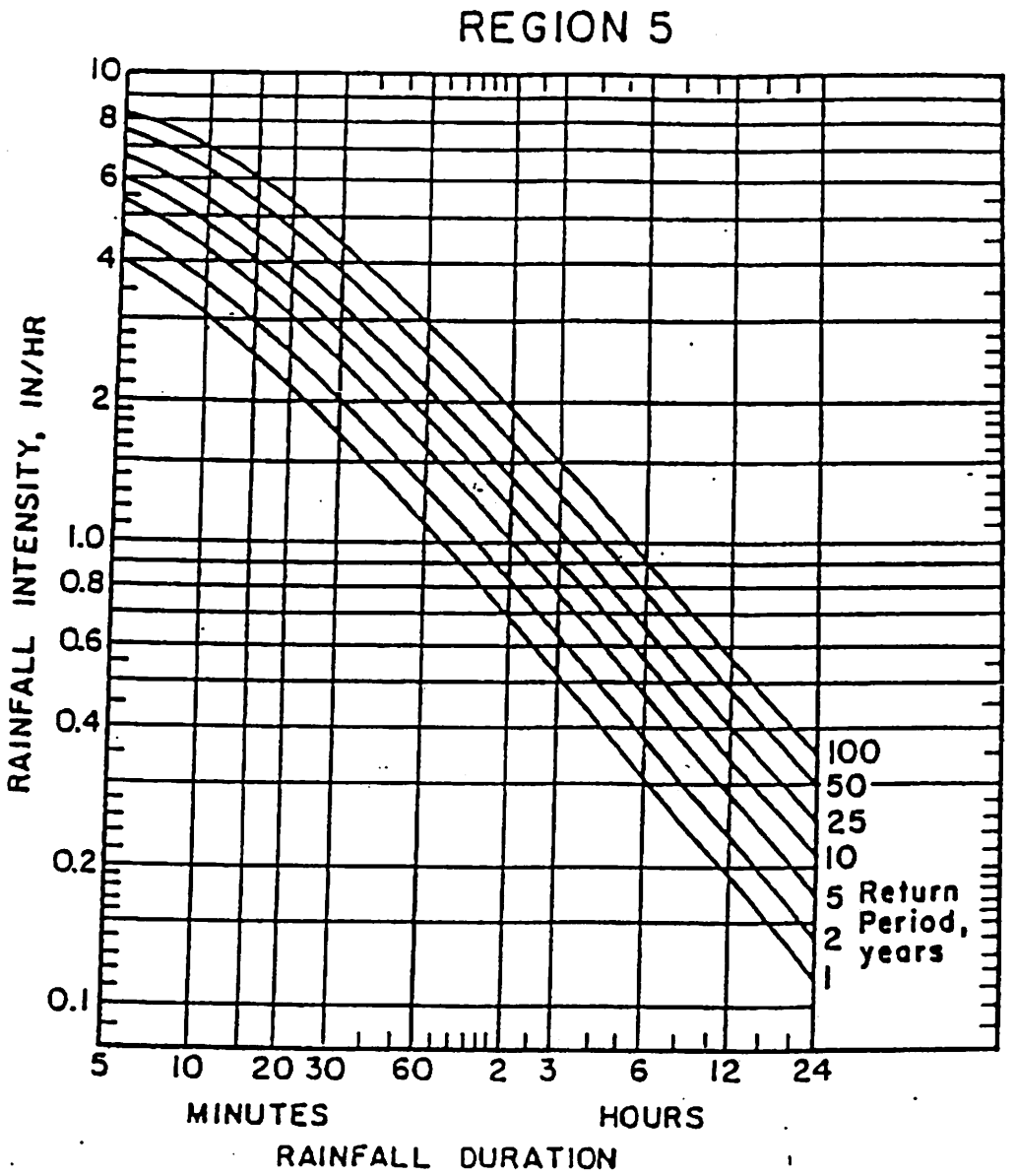
APPENDIX B.3

STORM INTENSITY-DURATION-FREQUENCY CURVES FOR REGION 4



APPENDIX B.3

STORM INTENSITY-DURATION-FREQUENCY CURVES FOR REGION 5



APPENDIX B.4

RUNOFF CURVE NUMBERS AND PERCENT IMPERVIOUS COVER

URBAN AREAS

Cover Description		Curve Numbers for Hydrologic Soil Group -			
Cover Type and Hydrologic Condition	Average Percent Impervious Area	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover < 50%)	0	68	79	86	89
Fair condition (grass cover 50% to 75%)	0	49	69	79	84
Good condition (grass cover > 75%)	0	39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	100	98	98	98	98
Streets and roads:					
Paved: curbs and storm sewers (excluding right-of-way)	100	98	98	98	98
Paved: open ditches (including right-of-way)	100	83	89	92	93
Gravel (including right-of-way)	100	76	85	89	91
Dirt (including right-of-way)	100	72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only).	0	63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)	100	96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)	0	77	86	91	94

APPENDIX B.4 (Cont'd.)

RUNOFF CURVE NUMBERS AND PERCENT IMPERVIOUS COVER

AGRICULTURAL LANDS (PERCENT IMPERVIOUS = 0%)

Cover Type	Cover Description	Hydrologic Condition	Curve Numbers for Hydrologic Soil Group - A	B	C	D
Fallow (1)	Bare soil	-	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops (1)	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain (1)	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80

APPENDIX B.4 (Cont'd.)

RUNOFF CURVE NUMBERS AND PERCENT IMPERVIOUS COVER

AGRICULTURAL LANDS (PERCENT IMPERVIOUS = 0%)

Cover Description			Curve Numbers for Hydrologic Soil Group -			
Cover Type		Hydrologic Condition	A	B	C	D
Close-seeded or broadcast legumes or rotation meadow (1)	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80
Pasture, grassland, or range - continuous forage for grazing (2)		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow - continuous grass, protected from grazing and generally mowed for hay.		-	30	58	71	78
Brush - brush-weed-grass mixture with brush the major element (3)		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30	48	65	73
Woods - grass combination (orchard or tree farm)		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods (4)		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30	55	70	77
Farmsteads - buildings, lanes, driveways, and surrounding lots		-	59	74	82	86

Footnotes:

(1) Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas; (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good $\geq$ 20%) and (e) degree of surface roughness.
Poor: Factors impair infiltration and tend to increase runoff.
Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

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

RUNOFF CURVE NUMBERS AND PERCENT IMPERVIOUS COVER

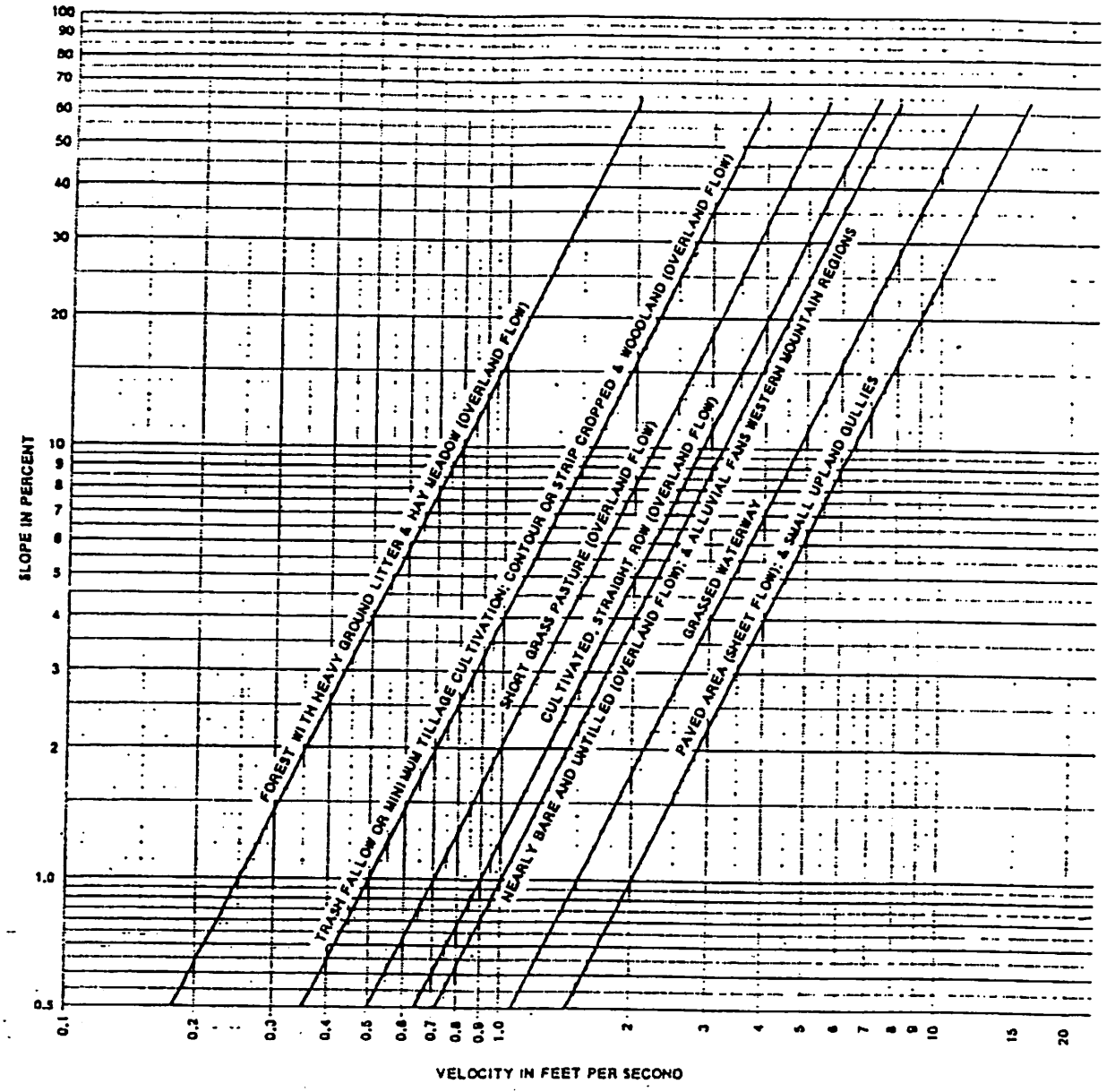
Footnotes: (Cont'd.)

(3) Poor: < 50% ground cover.
Fair: 50 to 75% ground cover.
Good: > 75% ground cover.

(4) Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

APPENDIX B.5

AVERAGE VELOCITIES FOR ESTIMATING OVERLAND FLOW AND TIME OF TRAVEL



APPENDIX B.6

RUNOFF COEFFICIENTS FOR THE RATIONAL METHOD

Type of Surface	Normal Range	Recommended Value
Pavement:		
Concrete or Bituminous Concrete	0.75 - 0.95	0.90
Bituminous Macadam or Surface Treated Gravel	0.65 - 0.80	0.75
Gravel, Macadam, etc.	0.25 - 0.60	0.50
Brick	0.70 - 0.85	
Roofs	0.70 - 0.95	
Sandy Soil:		
Cultivated or Light Growth	0.15 - 0.30	0.20
Woods or Heavy Brush	0.14 - 0.30	0.20
Lawns		
Flat, less than 2%	0.05 - 0.10	
Average, 2-7%	0.10 - 0.15	
Steep, 7% or more	0.15 - 0.20	
Clay Soil:		
Bare or Light Growth	0.35 - 0.75	0.50
Woods or Heavy Growth	0.25 - 0.60	0.40
Lawns		
Flat, less than 2%	0.13 - 0.17	
Average, 2-7%	0.18 - 0.22	
Steep, 7% or more	0.25 - 0.35	
Type of Area		
Business		
Downtown	0.70 to 0.95	0.90
Neighborhood	0.50 to 0.70	
Residential		
Single Family	0.30 to 0.50	
Multiunits, detached	0.40 to 0.60	
Multiunits, attached	0.60 to 0.75	
Residential, suburban	0.25 to 0.40	
Apartment	0.50 to 0.70	
Industrial		
Light	0.50 to 0.80	
Heavy	0.60 to 0.90	
Parks, Cemeteries, Golf Courses	0.10 to 0.25	
Railroad Yard	0.20 to 0.35	
Unimproved	0.10 to 0.30	

APPENDIX B.7

MANNING "n" VALUES

Surface	n
Uncoated cast-iron pipe	0.013
Coated cast-iron pipe	0.012
Commercial wrought-iron pipe, black	0.013
Commercial wrought-iron pipe, galvanized	0.014
Smooth brass and glass pipe	0.010
Smooth lockbar and welded "OD" pipe	0.011
Riveted and spiral steel pipe	0.015
Vitrified sewer pipe	0.013
Common clay drainage tile	0.012
Glazed brickwork	0.013
Brick in cement mortar; brick sewers	0.015
Neat cement surfaces	0.011
Cement mortar surfaces	0.013
Concrete pipe	0.012
Wood stave pipe	0.011
Plank flumes:	
Planed	0.012
Unplaned	0.013
With battens	0.015
Concrete-lined channels	0.014
Cement-rubble surface	0.020
Dry-rubble surface	0.030
Dressed-ashlar surface	0.014
Semicircular metal flumes, smooth	0.012
Semicircular metal flumes, corrugated	0.025
Canals and ditches:	
Earth, straight and uniform	0.025
Rock cuts, smooth and uniform	0.033
Rock cuts, jagged and irregular	0.040
Winding sluggish canals	0.025
Dredged earth channels	0.0275
Canals with rough stony beds, weeds on earth banks	0.035
Earth bottom, rubble sides	0.030
Natural stream channels:	
(1) Clean, straight bank, full stage, no rifts or deep pools	0.029
(2) Same as (1), but some weeds and stones	0.035
(3) Winding, some pools and shoals, clean	0.039
(4) Same as (3), lower stages, more ineffective slope and sections	0.047
(5) Same as (3), some weeds and stones	0.042
(6) Same as (4), stony sections	0.052
(7) Sluggish river reaches, rather weedy or with very deep pools	0.065
(8) Very weedy reaches	0.112

For additional "n" values, refer to Table 2.10.5.1 in PDT Publication B.

Rainfall, P (24-hour) ..... in			
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)			

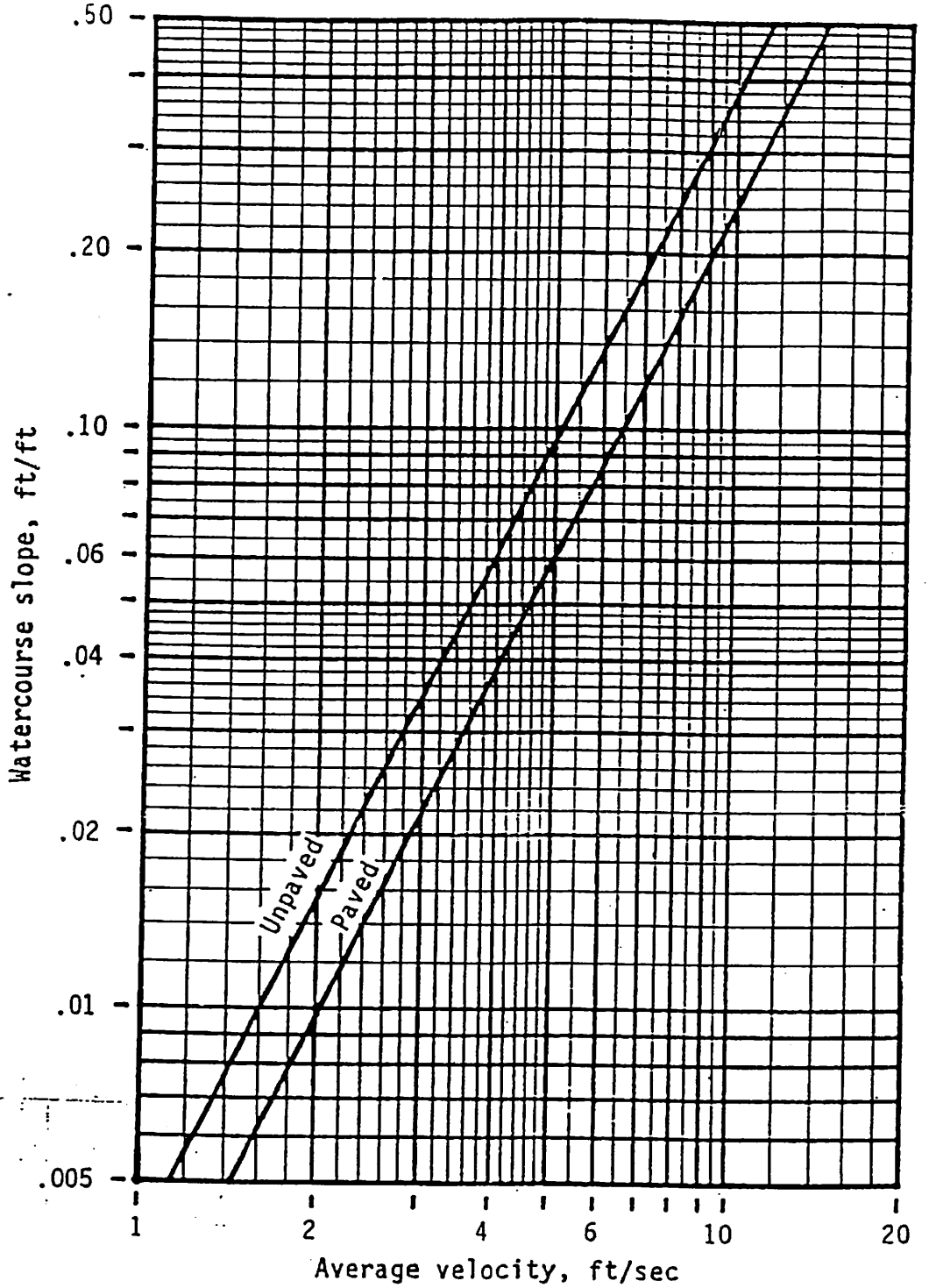


Figure 3-1.—Average velocities for estimating travel time for shallow concentrated flow.

CHARACTERISTICS OF PENNSYLVANIA SOILS -2

Soil Series	G	K	T	I	O
Keyport	C	.43	3	7	5
Klinesville	C/D	.28	2	6	
Kreamer		.29	3	7	5
pr dr var				10	
Lackawanna	C	.24	3	7	
Laidig	C	.28	4	7	
Lakin	A	.17	5	3	
Lamington	D	.43	3	10	8
Landisburg	C	.43	3	7	5
Langford	C	.28	3	7	5
Lansdale	B	.28	4	1	
Lansdowne				7	5
Lawrence	C	.43	3	9	6
Lawrenceville	C	.49	3	7	5
Leadvale	C	.43	3	7	5
Leck Kill	B	.28	3	1	
Leetonia	C	.24	3	5	
Legore	B	.24	3	1	
Lenew	C	.24	3	5	
Lehigh	C	.43	2	10	6
Leonardtown	D	.43	2	10	8
Letort		.43	4	1	
Lewisberry	B	.20	3	2	
Library	D	.43	3	10	6
Lickdale	D	.32	3	10	9
Linnside	C	.49	4	7	1
Litz	C	.32	3	5	
Lobdell	C	.49	4	7	1
Lorain	C/D	.49	3	10	
Lordstown	C	.28	3	5	
Loudenville	C	.32	3	4	
Loysville	D	.43	3	10	8
Luray	C/D	.49	3		
Lyles	B			9	
Mahoning	D	.49	3	9	6
Manlius	C	.37	2	5	
Manor	B	.43	3	2	
Mardin	C	.28	3	7	5
Markes	D	.43	3	8	8
Mazeppa	B	.32	3	2	
Meckesville	C	.32	4	7	
Mehoopany		.20	2		
Melvin	D	.49	4	9	2
Merc		.28	4	1	
Middlebury	B	.49	4	7	1
Millheim	(C)	.28	3		
Miner	D	.49	3	10	9
Minora	C	.49	4	4	
Monongahela	C	.43	3	7	5
Montalto	C	.37	2	1	
Montevallo	D	.32	4	6	
Montgomery	D	.43	3	10	9
Morris	C	.32	3	10	6
Morrison	B	.17	3	3	
Mount Lucas	C	.32	3	10	5
Murrill	B	.28	4	1	
Myersville	B	.32	4	1	

Soil Series	G	K	T	I	O
Natalie	C	.28	3	7	5
Nesnaminy	B	.32	4	1	
Newark	C	.49	4	9	1
Nolo	B	.43	3	10	8
Northumberland	C/D	.28	2		
Norton	C	.32	3	1	
Norwich	D	.32	3	10	9
Oquecuon	C/D	.43	2	6	
Oquaga	C	.28	3	5	
Otheilo	D	.37	3	9	7
Ottawa		.17	5	3	
Papakating	D	.49	3	9	3
Pekin	C	.37	3	7	5
Penn	C	.32	3	4	
very shallow				6	
Pequea	C	.43	3	4	
Phelps	B	.24	3	7	4
Philo	B	.49	4	7	1
Plainfield	A	.17	5	3	
Platea	C	.43	3	10	6
Pope	B	.49	4	1	
Purdy	D	.43	3	10	8
Quakertown	B	.32	3	1	
Rainsboro	C	.37	4		
Ramsey	D	.28	2	6	
Raritan	C	.43	3	7	5
Ravenna	C	.37	3	10	6
Rayne (Wellston)	B	.28	4	1	
Readington	C	.43	3	7	5
Reaville	C	.43	2	8	6
Red Hook	C	.24	3	9	7
Rimer	C	.24	4	10	6
Robertsville	D	.43	3	10	8
Rohrersville	C	.43	3	10	6
Rowland	C	.43	4	9	1
Rushtown	A	.17	4	3	
Ryder	C	.37	3	4	
Sassafras	B	.28	4	2	
Scio	B	.49	3	7	4
Sciotoville	C	.43	3	7	5
Sedan		.32	4	2	
Sequatchie	B	.24	5	1	
Sheffield	D	.37	3	10	8
Shelmadine	D	.32	3	10	8
Shelocta	B	.28	4	1	
Sloan	D	.49	3	9	3
Steinsburg	C	.28	2	5	
Swartswood	C	.20	3	3	
Sweden	B	.32	3	7	
Thorndale	D	.43	3	10	8
Tilsit	C	.43	3	7	5
Tioga	B	.49	4	1	
Titusville	C	.32	3	7	5
Trexler	C	.28	4	1	
mod shallow				5	

Soil Series	G	K	T	I	O
Troy	C	.28	3	7	
Trumbull	D	.49	3	10	8
Tughill	D	.24	3	10	9
Tunkhannock	A	.24	3	3	
Tygart	D	.43	3	10	6
Tyler	D	.43	3	10	6
Unadilla	B	.49	3	1	
Ungers	B	.32	4	2	
Upshur	C	.43	3	7	
Vandergrift	C	.37	3	7	4
Vanderlip	A	.24	3	3	
Venango	C	.37	3	10	6
Volusia	C	.32	3	10	6
Vrooman	B	.49	3		
Wallington	C	.49	3	10	6
Wallkill	C/D	.49	3	9	3
Warners	A/D	.49	3	10	3
Washington	B	.32	4	1	
coarse var				2	
Watchung	D	.43	2	10	8
Watson	C	.32	3	7	5
Wauseon	B/D	.49	3	9	9
Wayland	C/D	.49	4	9	2
Weeksville	B/D	.49	3	9	9
Wehadkee	D	.49	4	9	2
Weikert	C/D	.32	2	6	
Wellsboro	C	.28	3	7	5
Wellston	B	.32	4	1	
Westmoreland	B	.37	3	1	
Wharton	C	.43	3	10	5
Wheeling	B	.32	4	1	
Whitaford	B	.32	3	2	
Whitwell	C	.32	3	7	5
Wickham	B	.28	4	1	
Williamson	C	.49	3	7	5
Wiltshire	C	.43	3	7	5
Woodglenn	D	.49	3	10	9
Woodstown	C	.28	4	7	4
Wooster	C	.32	4	2	
Woostern	B	.17	3	3	
Worsham	D	.43	3	10	8
Worth	C	.17	3	3	
Wurtsboro	C	.24	3	7	5
Wyalusing	D	.49	4		2
Zipp	C/D	.43	3	10	6
Zoar	C	.43	3	7	5

References:

G SCS TR-55 1975
K, T PA Tech. Guide III-B 1971
I PA Irrigation Guide 1972
O PA Drainage Guide 1971

mdsnaw mar '82

CHARACTERISTICS OF PENNSYLVANIA SOILS

Soil Series	G	Ke	To	I	D'
Abbottstown	C	.43	3	9	6
Albia	C	.32	3		
Albrights	C	.43	3	7	5
Alden	D	.32	3	10	9
Aldino	C	.43	3	7	
Allegheny	B	.32	4	1	
Allenwood	B	.32	4	1	
Allis	D	.43	3	8	8
Altavista	C	.32	4	7	4
Alton	B	.20	3	3	
Alvira	C	.32	3	9	6
Amaranth		.43	3		5
Andover	D	.43	3	10	8
Arendtsville	B	.32	4	2	
Ariel		.32	3		
Armagh	D	.43	3	10	8
Armenia		.20	3		
Arnot	C/D	.20	2	6	
Ashton	B	.28	4	1	
coarse variant				2	
Atherton	B/D	.32	3	9	9
Athol	B	.37	4	1	
Atkins		.49	4	9	2
Baile	D	.49	3	10	8
Barcour	B	.49	4	1	
Bartle	D	.43	3	9	8
Basher	B	.49	4	7	1
Bath	C	.24	3	7	
Bedford	C	.43	3	7	5
Bedington	B	.32	4	1	
Belmont	B	.37	3	1	
Beltsville	C	.43	3	7	5
Benson	C/D	.28	2	6	
Berks	C	.28	3	5	
Bermudian	B	.43	4	1	
Berrien		.17	5	9	5
Birdsall	D	.49	3	10	9
Birdsboro	B	.28	4	1	
Blago	D	.43	3	10	9
Blairton	C	.43	3	7	5
Bowmansville	C	.49	4	10	2
Boynton		.32	3	10	8
Braceville	C	.24	3	7	5
Brandywine	C	.24	3	5	
Brecknock	B	.32	3	1	
channery var.				3	
Brinkerton	D	.43	3	10	8
Brooke	C	.43	3	4	
shallow var.				6	
Buchanan	C	.32	3	2	5
Bucks	B	.32	4	1	
Burgin	D	.49	3	10	9
Butlertown	C	.43	3	7	5
Calvert	D	.49	3	10	8
Calvin	C	.24	3	5	
Camoridge	C	.37	3	7	5
Canadice	D	.49	3	10	8
Caneacea	D	.49	3	10	6
Canfield	C	.32	3	7	5
Captina		.43	3	7	5
Cardiff	B	.28	3	5	
Catoctin	C	.32	3	5	
Cattaraugus	C	.24	3	7	
Cavode	C	.43	3	10	6
Chagrin	B	.49	4	1	
Chalfont	C	.43	3	10	6
Chambersburg		.28	3	4	
Chavies	B	.24	4	1	
Chenango	A	.24	3	3	
Chester	B	.32	4	1	
Chewacla	C	.49	4	7	1
Chili	B	.24	3	3	
Chillisquaque		.43	3	10	6
Chilo	B/D	.32	3	10	9
Chippewa	B/D	.32	3	10	8
Christiana	B	.43	3	7	
Chrome	C	.32	2	4	
Clarksburg	C	.43	3	7	5
Clymer	B	.28	3	2	
Codorus	C	.49	4	7	1
Collamer	C	.49	3		
Comly	C	.37	3	7	5
Conestoga	B	.43	4	1	
Congaree	B	.49	4	1	
Conotton	B	.28	3	3	
mod wl dr var				7	
Conowingo	C	.43	3	7	6
Conyngham		.32	3	10	6
Cookport	C	.37	3	7	5
Corydon	C			6	
Cossayuna	C	.24	3	7	
Croton	D	.43	3	10	8
Culvers	C	.28	3	7	5
Dalton	C	.49	3	10	6
Dannemora	D	.28	3		
Dekalb	C	.24	3	5	
Dilldown		.17	3	5	
Doylestown	D	.43	3	10	8
Drab		.37	3	7	
Drifton	C	.28	3	7	5
Duffield	B	.32	4	1	
Duncannon	B	.43	3	1	
Dunning	D	.43	3	10	3
Edgemont	B	.28	3	2	
Edom	C	.28	3	4	
Elioak	C	.32	4	1	
Elk	B	.32	4	1	
Elkins	D	.49	3	10	3
Elkinsville	B	.37	4	1	
Ellery	D	.32	3	10	8
Elliber	A	.24	4	3	
Elsinboro	B			1	
Emceyville	C	.24	3	7	5
Erie	C	.32	3	10	6
Ernest	C	.43	3	7	5
Evendale		.37	3	10	
Fallsington	D	.28	4	9	7
Fleetwood		.28	3	2	
Fogelsville	B	.32	4	1	
Frankstown	B	.32	3	1	
Fredon	C	.24	3	9	7
Frenchtown	D	.37	3	10	8
Ganoga		.20	2		
Gatesburg	A	.17	5	3	
Germania		.24	3	2	
Gilpin	C	.32	3	4	
Ginat	D	.43	4	9	7
Glenelg	B	.32	3	1	
Glenville	C	.32	3	7	5
Gresham	C	.37	3	10	6
Guernsey	C	.43	3	7	4
pr dr var				10	
Guthrie	D	.43	3	10	8
Hagerstown	C	.32	4	1	
mod deep				4	
shallow				6	
Halsey	D	.24	3	9	9
Hanover	C	.37	4	1	
Hartleton	B	.24	3	3	
Hartsells	B	.28	3	2	
Hatboro	D	.49	4	10	2
Hazleton	B	.24	3	2	
Highfield	B	.28	3	1	
Hollinger	B	.43	3	4	
Holly	D	.49	4	9	2
Holston	B	.32	4	1	
Horneil	D	.43	3	8	6
Howard	B	.24	3	3	
Howell	C	.43	3	1	
Hublersburg	C	.32	4	1	
Huntington	B	.49	4	1	
coarse var				2	
local alluvium				1	
Imler		.43	3	7	5
Iva	C				5
Kedron (see Albrights)					
Kerrtown		.49	4	1	

G Hydrologic Soil Group (SCS)
X/X - Drained/Undrained
Ke Soil-Erodibility Factor (USLE)
To Erosion Tolerance (tons/acre)
I Irrigation Group Number
D' Drainage Group Number

SAMPLE PROBLEM
SELECTION OF CONTROL TECHNIQUE
TO MEET DESIGN CRITERIA FOR RUNOFF POLLUTANTS

Example -

- Infiltration pits and trenches
- Porous pavement (asphalt)
- Seepage areas
- Cistern storage
- Impoundment (dry)
- Impoundment (wet)
- Parking lot storage
- Rooftop detention
- Filter strips

Step 5: Evaluate the potential control techniques based on the techniques' control and pollutant removal capabilities to determine which techques meet the control criteria. Use the performance estimates of Table B-2 of this appendix.

Example -

Infiltration pits and trenches:

Runoff Peak Rate
4,600 - .90 (4600) = 460 gpd (ok)

Sediment
1,787 - .45 (1787) = 983 lb/MG (over)

Phosphorus
5.48 - .40 (5.48) = 3.28 lb/MG (ok)

Porous Pavement (asphalt):

Runoff Peak Rate
4,600 - 1.00 (4600) = 0 gpd (ok)

Sediment
(unknown)

Phosphorus
5.48 - .40 (5.48) = 3.29 lb/MG (ok)

Seepage Areas:

Runoff Peak Rate
4,600 - .45 (4600) = 2,070 gpd (over)

APPENDIX B.11

SAMPLE PROBLEM
SELECTION OF CONTROL TECHNIQUE
TO MEET DESIGN CRITERIA FOR RUNOFF POLLUTANTS

Step 1: Identify the type of development activity.

Example - A small shopping center is proposed for a 15 acre lot in the Manny Run (M-MR) subwatershed. 4 acres of the lot will be covered by a single, flat roof commercial structure. 6 acres of the lot will be an asphalt parking lot. The remaining 5 acres are grass-covered with some small shrubbery and trees.

Step 2: Using Table B-1 of this appendix, determine the control design criteria to be used.

Example - For subwatershed M-MR, release rate for peak flow rate = 60%. Maximum loading rates for pollutants are 16.68 lb/MG for phosphorus and 918 lb/MG for sediment.

Step 3: Using the computational methods presented in Sections 303 and 304, calculate the storm runoff's peak flow rate and pollutant loadings for pre- and post-development conditions.

Example - Calculate peak flow rates - Assume calculated peak flow rates are equal to 2,00o gpd for pre-development and 4,600 gpd (0.0046 MG/day) for post-development for the 100-year storm event. The design peak flow rate, based on the release rate percentage is .60 * 2,000 gpd = 1,200 gpd.

Calculate pollutant loadings - Using the unit areal loading rates presented in Appendix B.10 for the Main Stem and commercial land use (P = 0.92 lb/ac/yr and TSS = 300 lb/ac/yr) calculate loading in lb/MG for post-development conditions.

P loading in lb/MG =

$$\frac{0.92\ \text{lb}}{\text{acre x year}} * \frac{\text{day}}{.0046\ \text{MG}} * \frac{(4+6)\ \text{acres}}{1} * \frac{\text{Year}}{365\ \text{days}} = 5.48\ \frac{\text{lb}}{\text{MG}}$$

Since the P loading estimate of 5.48 lb/MG is less than the maximum allowable loading rate of 16.68 lb/MG, P control is not considered a problem for this sample.

TSS loading in lb/MG =

$$\frac{300\ \text{lb}}{\text{acre x year}} * \frac{\text{day}}{.0046\ \text{MG}} * \frac{(4+6)\ \text{acres}}{1} * \frac{\text{Year}}{365\ \text{days}} = 1787\ \frac{\text{lb}}{\text{MG}}$$

Step 4: Select potential stormwater control techniques based on physical suitability for the particular development site using Tables C-1 to C-4 of the Plan.

SAMPLE PROBLEM
SELECTION OF CONTROL TECHNIQUE
TO MEET DESIGN CRITERIA FOR RUNOFF POLLUTANTS

Sediment
1,787 - .45 (1787) = 983 lb/MG (over)

Phosphorus
5.48 - .45 (5.48) = 3.01 lb/MG (ok)

Rooftop Detention:

Runoff Peak Rate
4,600 - .80 (4600) = 920 gpd (ok)

Sediment
(not applicable)

Phosphorus
(not applicable)

Filter Strip:

Runoff Peak Rate
4,600 - .45 (4600) = 2530 gpd (over)

Sediment
1,787 - .85 (1787) = 268 lb/MG (ok)

Phosphorus
5.48 - .80 (5.48) = 1.10 lb/MG (ok)

Based on these calculations, the following alternative control tecniques are recommended:

Alternative 1 - Construct a wet impoundment in the 5 acres of undeveloped area to receive runoff from the flat roof and the parking lot.

Alternative 2 - Use rooftop detention in conjunction with filter strips which are constructed around the perimeter of the parking lot to receive its runoff. The water detained in the rooftop should be recycled for water uses during dry weather (cleaning parking lot and/or watering grassland) or released to the filter strips after the storm.

Step 6: Evaluate the alternatives based on the control techniques' implementation and operation features. A preliminary design of the alternatives could also be done at this time to better evaluate the control capabilities in order to select a preferred alternative.

APPENDIX B.11 (Cont'd.)

SAMPLE PROBLEM
SELECTION OF CONTROL TECHNIQUE
TO MEET DESIGN CRITERIA FOR RUNOFF POLLUTANTS

Sediment
1,787 - .45 (1787) = 983 lb/MG (over)

Phosphorus
5.48 - .45 (5.48) = 3.01 lb/MG (ok)

Cistern Storage:

Runoff Peak Rate
4,600 - .80 (4600) = 920 gpd (ok)

Sediment
1,787 - .48 (1787) = 929 lb/MG (over)

Phosphorus
5.48 - .45 (5.48) = 3.01 lb/MG (ok)

Impoundment (dry):

Runoff Peak Rate
4,600 - .80 (4600) = 920 gpd (ok)

Sediment
1,787 - .15 (1787) = 1519 lb/MG (over)

Phosphorus
5.48 - .10 (5.48) = 4.93 lb/MG (ok)

Impoundment (wet):

Runoff Peak Rate
4,600 - .80 (4600) = 920 gpd (ok)

Sediment
1,787 - .60 (1787) = 715 lb/MG (ok)

Phosphorus
5.48 - .30 (5.48) = 3.29 lb/MG (ok)

Parking Lot Storage:

Runoff Peak Rate
4,600 - .80 (4600) = 920 gpd (ok)

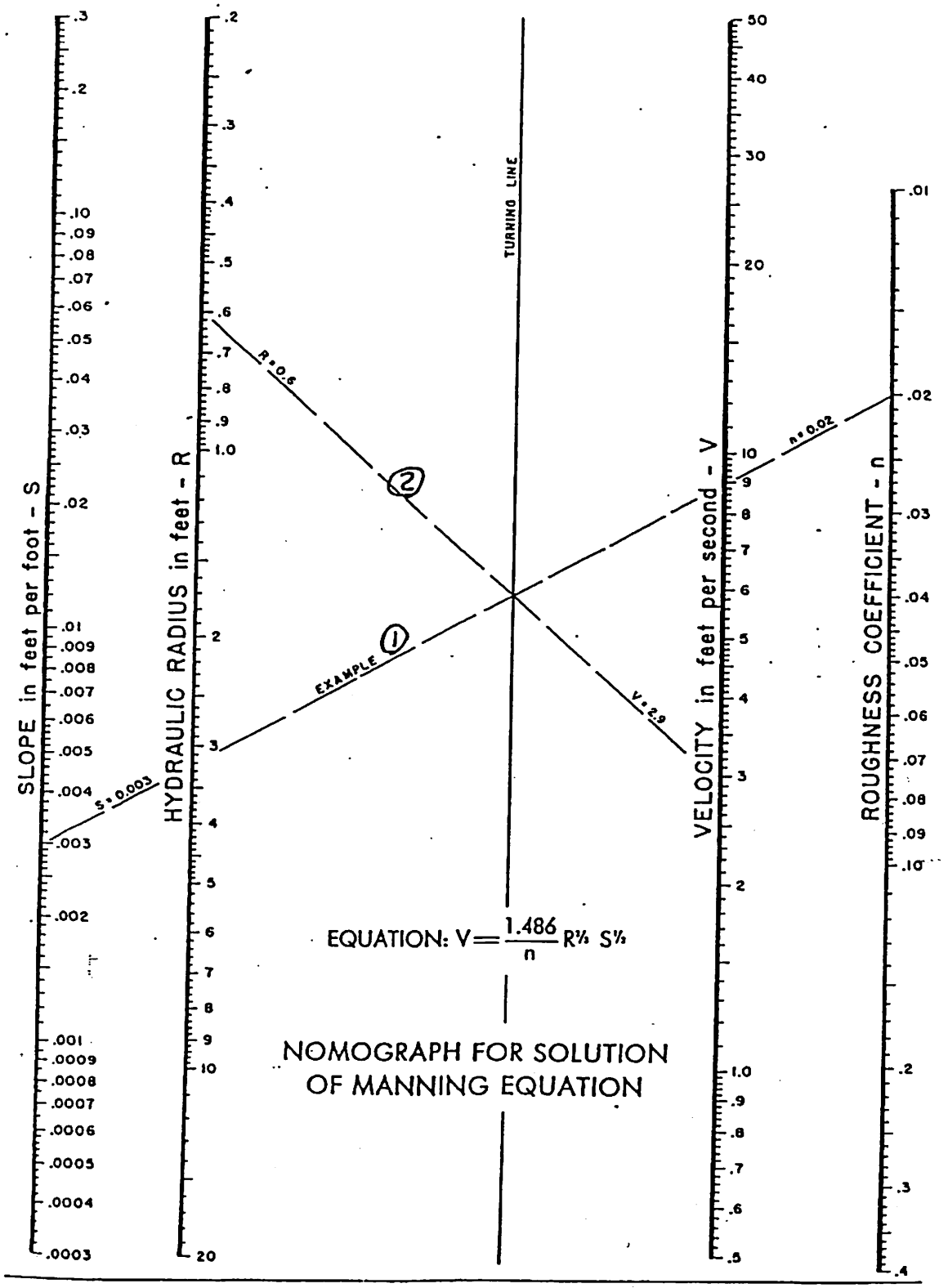


Fig. 4-8. Nomograph for solution of Manning's equation, (4)

APPENDIX C

APPENDIX C

STORMWATER MANAGEMENT FACILITIES DESIGN AND CONSTRUCTION SPECIFICATIONS

C.1 Facilities.

1. All stormwater management facilities including storm sewer pipes, open channels, ditches, swales and any other water carrying facilities shall be designed for the ten (10) year post-development storm event unless the Township requires a larger storm event because of special conditions. In cases where the applicant proposes the use of stormwater management facilities for control of stormwater on the property prior to discharge off the property, such facilities (cisterns, roof-top storage, etc...) may be designed for storm events of less than 10 years, provided however, that the total effect will be the control of the 10 year storm, at the specified release rate, at the discharge point(s) on the project property line.

2. Level of control and Design Parameter Calculations.

   a. The time of concentration is defined as the interval of time required for water from the most remote portion of the drainage area to reach the point in question. Calculations of the time of concentration include calculations of travel times for sheet flow, shallow concentrated flow, open channel, or some combination of these. Chapter 3 of the SCS Technical Release No. 55, Second Edition (June 1986) shall be used to determine average velocities for estimating travel times for the various flow segments.

   b. The capacity and velocity of flow in open channels and in closed drains not under pressure shall be determined by the Manning equation. Maximum permissible open channel velocities and design standards shall be in accordance with good engineering practice as documented in the "Engineering Field Manual for Conservation Practices", Hydraulic Design series No. 3, U.S. Department of Transportation.

   c. Storm sewer pipes shall be installed on sufficient slopes to provide a minimum flow velocity of three (3) feet per second when flowing full.

3. Design and construction Specifications.

   a. Width requirements for public easements shall be as follows for storm drains: $W=2d+D+2$ where W is the easement width in feet, d is the depth of pipe from the invert to finished grade and D is the inside pipe diameter. The calculated easement width shall be rounded up to the next five (5) feet increment with the minimum required width being ten (10) feet.

   b. For ditches, at a minimum, the easement shall be ten (10) feet wider than the top width of the ditch, with a least ten (10) feet required on one side for future access.

The easement width required shall be rounded up to the next five (5) feet increment. Additional width may be required, as necessary, by the Township.

c. Storm sewer pipes and culverts, other than those used as basin outlets, which are intended to be dedicated to the Township shall have a minimum diameter of fifteen (15) inches. All pipes and culverts shall be made of reinforced concrete culvert pipe (RCP), corrugated metal pipe (CMP) corrugated aluminum alloy pipe, corrugated polyethylene pipe (AASHTO - M252 and M294). Corrugated metal pipe shall be helical, 16-gage minimum, galvanized steel pipe. When conditions are such that the pipe requires coating (see Table 2.10.5.6, PA DOT Publication No. 13, Design Manual, Part 2, August 1981), galvanized steel pipes and fittings shall be fully-coated, inside and out, with either polymer or asphaltic cement in accordance with PA DOT Publication No. 408 Specifications. All storm sewer pipes shall be laid to a minimum depth of one (1) foot from subgrade to the crown of the pipe.

d. Pressure flow is permitted in storm sewers. The elevation of the hydraulic gradient shall be a least one (1) foot below ground level. Pressure heads up to twenty-five (25) feet can be used with concrete pipe with rubber gasketed joints.

e. Manholes, inlets, headwalls and endwalls proposed for dedication to the Township or located along streets shall conform to the PA DOT Bureau of Design, "Standards for Roadway Construction", Publication No. 72, in effect at the time the design is submitted. The design may be modified by adopted municipal construction standards. Headwalls and endwalls shall be used where storm runoff enters or leaves the storm sewer horizontally from either a natural or manmade channel.

f. Inlets shall be placed on both sides of the street at low points; at a maximum interval of six hundred (600) feet along any one continuous line; at points of abrupt changes in either the horizontal or vertical directions of storm sewers; and at points where the depth of flow in the street gutters exceeds three (3) inches, or where the spread exceeds 10 feet on the typical street section calculated on a 2.33-year storm recurrence frequency. Inlets shall normally be along the curb line at or beyond the curb radius points. At intersections, the depth of flow across the through streets shall not exceed one (1) inch. For inlets on continuous grades the maximum amount of water that should by bypassed onto the next downstream inlet is ten (10) percent. Inlets shall be of the Type C, M, or S type, as discussed in PA DOT Publication 13 and the "Standards for Roadway Construction", Publication No. 72. Inlet grates shall be cast iron or structural steel. A bicycle-safe grate shall be installed in areas where bicycle traffic is anticipated, such as curbed roadways or for roadways specifically established and signed as bikeways or having bike lanes.

g. Manholes may be substituted for inlets at locations where inlets are not required to handle surface runoff. Manholes shall be located on a continuous storm sewer system at all abrupt changes of grade, at all locations where a transition in storm

sewer pipe sizing is required, at all angle points exceeding fifteen (15) degrees, and at all points of convergence of two or more influent storm sewer mains. Where storm sewer pipe is designed on a radius, the pipe shall be manufactured to the design radius.

4. Operation Specifications

a. Wherever possible, roof drains and pipes shall discharge water into a dispersion or infiltration control facility and not into street gutters or storm sewers.

b. All existing natural watercourses, channels, drainage systems and areas of surface water concentration shall be maintained in their existing condition unless an alteration is approved by the Township.

c. Flow velocities from any storm sewer outlet shall not result in a deflection of the receiving channel. Energy dissipators shall be placed at the outlets of all storm sewer pipes where flow velocities exceed maximum permitted water carrying velocities.

C.2 Impoundment facilities.

1. Permanent detention basins shall be designed with a primary outlet discharge that is less than or equal to the predevelopment peak discharge for a ten (10) year storm event. A greater peak discharge may be permitted by the use of secondary outlets when the developer or his engineer show that (1) the increased peak discharge can be properly handled by the existing or proposed downstream stormwater management facilities; (2) the increased peak discharge will not be detrimental to the downstream areas; and (3) for any specified storm event the post-development peak discharge will not be greater than the pre-development peak discharge of an equivalent storm event. However, in any case, the basin shall be designed so that the emergency spillway is capable of passing the 100 year storm without failure of the facility.

2. General Design

a. All basins shall be structurally sound and shall be constructed of sound and durable materials. The completed structure and foundation of all basins shall be stable under all probable conditions of operation. Where dam permits are required, the design must meet the provisions of the Dam Safety and Encroachment Act as outlined in Chapter 105, Dam Safety and Waterways Management Rules and Regulations.

b. The effect of embankment failure on downstream areas shall be considered in the design of all basins. Where possible, the basin shall be designed to minimize the potential damage of embankment failure.

c. In some cases, separate detention facilities for a number of sites may be more expensive and difficult to maintain than a joint facility. In such cases the Township may consider joint detention facilities that fulfill the detention requirements.

d. No basin shall be located within the one hundred (100) year flood hazard area of the floodplain. Construction of basins within the one hundred (100) year floodplain shall be avoided, where possible. If construction is unavoidable, the situation shall be examined for proper functioning.

e. To facilitate drainage prior to stream flooding, impoundments may be waived by the Township upon the recommendation of the Township Engineer. Such a decision depends on the proximity of the proposed impoundment to major streams, and the hydrology of the watershed.

f. An easement for maintenance crew access to the pond and outlet areas shall be established around basins requiring maintenance. The limits of such easements shall be fifteen (15) feet from the outside toe of the dams and embankments and the top of all basin side slopes. The maintenance easement shall be connected to a public right-of-way.

g. A specific maintenance plan shall be formulated outlining the schedule and scope of maintenance operation. Items to be included in the maintenance plan are sediment removal, inspection of inlets and outlets, vegetation and insect control, ponding area prevention and safety inspections.

3. Basin Design

a. A basin shall, when site dimensions allow, have a length to width ratio of at least 2:1 to 3:1 and the distance between basin inflow and outflow points shall be maximized to maximize the travel time through the pond.

b. A riprap apron of adequate length and flare shall be provided at all surface discharge points to disperse and slow down flow to minimize erosion, promote settling, and minimize resuspension of settled pollutants. The apron shall extend to the crown of the pipe and be sized according to the procedure set forth in **Appendix D - Design of Outlet Protection** or similar procedure. Riprap size shall be determined by the flow velocity at the discharge point as follows:

Flow Velocity (feet/second)	Average Stone Size (inches)
Up to 6	6-8
6 to 9	8-12
Greater than 9	(a)

(a) Shall use design procedure presented in Appendix D - Design of Outlet Protection or similar procedure approved by the Township or Borough.

c. A cutoff trench of relatively impervious material shall be provided within all basin embankments whose side slope ratios are steeper than three (3) horizontal to one (1) vertical.

d. All culverts through basin embankments shall have properly spaced concrete cutoff collars or factory welded anti-seep collars according to the guidelines set forth in the USDA SCS (PA) "Standards and Specifications for Ponds" (#378).

e. The Township shall make the decision to require fencing based on potential hazards at the site. Basins with water-edge side slopes steeper than three (3) feet may require six (6) foot high fencing of a material acceptable to the municipality. A locked gate shall be supplied to allow restricted access to the basin for maintenance. For impoundments subject to freezing of detained runoff, some means of "thin ice" warning shall be incorporated in the overall operations plan established for the basin.

f. The basins shall have a minimum bottom slope of one (1) percent towards the primary outlet to assure positive drainage and prevent saturated conditions and maintenance problems. Low flow channels may be required to convey small inflows to the basin outlet.

g. Safety ledges shall be constructed on the side slopes of all detention basins having a permanent pool of water. The ledges shall be four (4) to six (6) feet in width and located approximately two and one half (2 1/2) to (3) feet below and one (1) to one and one half (1 1/2) feet above the permanent water surface.

h. The minimum top width of all dams and embankments shall be as follows:

Height (feet)	Top Width (feet)
0-5	8
5-15	10

i. The design top elevation of all dams and embankments shall be equal to or greater than the maximum water surface in the basin resulting from the routed one hundred (100) year storm, plus twelve (12) inches of freeboard. The design height of the dam shall be increased by the amount needed to insure that the design top elevation will be maintained following settlement. This increase shall not be less than five (5) percent.

4. Inlet and Outlet Design

a. Dry detention basins shall have an outlet structure designed to drain the basin within 24 hours. All outlet structures and emergency spillways shall include a satisfactory means of dissipating the energy of discharge without endangering both the safety and integrity of either the basin or the downstream drainage channel and drainage area. If riprap is used to dissipate energy, the design criteria presented previously shall govern.

C.3 Infiltration Facilities.

1. Infiltration pits and trenches shall be designed to provide control for the ten (10) year storm event, seepage areas and filter strips shall be designed to provide control for the 5 year storm event.

2. Level of Control and Design Parameter Calculations

a. A seepage analysis must be made for infiltration pits and trenches to determine any adverse effects of seepage on nearby building foundations, roads, and parking lots. Pits and trenches must never be located next to foundation walls.

b. A soil analysis shall be submitted with the design plans of infiltration facilities. Surrounding soils shall have a percolation rate of at least 0.6 inch per hour. A groundwater quality analysis shall also be made and shall include depth of water table (with seasonal variations), probable runoff pollutants, and the uses of the local groundwater.

3. Design and Construction Specifications

a. Infiltration facilities shall not be considered in fill areas due to the lack of infiltration capacity in areas of controlled fill and the potential slope slippage problems in areas of uncontrolled fill.

b. Seepage areas shall not allow ponding to exceed eighteen (18) inches of depth. Soil percolation rates for these areas shall be at least 0.6 inches per hour. Areas shall be graded to allow positive drainage but slopes shall be as slight as possible to minimize velocities. Seepage areas should also include overflow systems such as flanking grass diversion swales graded to catch and transport excess water without subjecting nearby structures to flood waters.

c. Filter strips widths shall be at least twenty-five (25) feet and should be designed with the following parameters:

- Land use and treatment above the strip,

- Slope of land above and in the strip,
- Length of slope above strip,
- Erodibility of soil above strip,
- Type of vegetation in strip, and
- Degree of maintenance the strip will receive.

d. Infiltration trenches shall have a side area to bottom area ratio less than or equal to 4:1. Wheel stops or segmented curbs shall be used to keep vehicular traffic off the trenches when they are not protected by grating.

e. Volume storage calculations for pits and trenches depends on the intended purpose of the facility. A pit or trench designed to store all site runoff would be sized for the maximum runoff volume. A second option is to design the facility to store only the flow generated in excess of the pre-development condition. In this option some method of diverting flow into the facility is needed. This could be a weir device incorporated into base flow channels sized only to carry the pre-development runoff rates.

f. The aggregate filler of trenches and pits shall be stone with a size range of one (1) to two (2) inches. These stones shall be poorly graded to include a few stones smaller than the selected size. Rounded stone is preferable to crushed stone. The side walls of the facility shall be lined with a filter cloth or other permeable material to prevent soil from creeping into the void space.

4. Operation Specifications

a. Maintenance tasks shall include maintenance of a dense grass buffer strip for surface facilities, removal of accumulated sediments within the pre-treatment devices of underground facilities, and partial or total reconstruction of facility in the event of clogging.

C.4 Cistern Facilities.

1. The design of the cistern storage volume and release rate is dependent upon the purpose of the structure. For reducing peak runoff rates, the facility shall be designed to detain the post-development 2.33-year storm event and release it at the pre-development peak rate and velocity. For controlling non-point source pollution, additional storage is needed to capture a predetermined initial volume of runoff which is to be released at a very slow rate.

2. For underground cisterns more than one access point for ventilation and cleaning shall be provided. Access manholes or drop boxes shall be sufficiently large to allow maintenance equipment to reach the facility. At least one access opening shall be a minimum of sixty (60) inches in diameter.

3. To ensure complete drainage of the facility, the minimum slope of the tank floor shall be one (1) percent. If a pumping system is included, provisions shall be made to prevent pump clogging and standby pumping capability shall be provided.

4. The outlet pipe shall not be less than five (5) inches in diameter to lessen the possibility of it becoming clogged. When low release rates are designed for the outlet to enhance the water quality obtained through sedimentation, special maintenance considerations must be made for removing the accumulated sediments.

C.5 Rooftop Detention.

1. The rooftop detention storage volume shall be designed to detain the post-development 2.33-year storm event and release it at the pre-development peak rate and velocity.

2. Roof design shall meet all Building and Occupational Code Act (B.O.C.A.) building code standards. Depth of rooftop ponding shall not exceed three (3) inches. Rooftops shall be capable of supporting a "live" load equal to thirty (30) pounds per square foot. These requirements allow for a reasonable safety factor because thirty (30) pounds allow for 5.8 inches of water. Roof drain requirements are as follows:

Minimum Number of Drains	Roof Area (Square Feet)
2	$\leq$10,000
4	>10,000 and $\leq$40,000
1/10,000 SF	>40,000

3. Maintenance shall consist of inspecting and cleaning inlets and of removing accumulated debris, ice, and fallen leaves.

C.6 Parking Lot Storage.

1. The parking lot storage volume shall be designed to detain the post-development 2.33-year storm event and release it at the pre-development peak rate and velocity.

2. The storage area shall have a minimum one (1) percent slope to the control outlet to ensure positive drainage following a storm. The maximum depth of ponded water within the storage area shall not exceed six (6) inches for pedestrian safety and to avoid wet brakes and other vehicle maintenance problems. The storage system shall be designed so that an overflow resulting from either clogging of the principle release structure or runoff in excess of the design storm does not result in flooding of nearby buildings or thoroughfares. The control orifice at the discharge control structure shall not be less than four (4) inches in diameter.

C.7 Erosion and Sediment Control.

1. All earth moving activities shall be conducted in such a way as to minimize accelerated erosion and resulting sedimentation. Measures to control erosion and resulting sedimentation. Measures to control erosion and resulting sedimentation shall, at a minimum, meet the standards of Chapter 102 (Erosion Control) of Title 25, Rules and Regulations of the PA DER and the standards of the Conservation District. An erosion and sediment control plan must be prepared and submitted to the Conservation District for their review and approval before any development activity begins.

2. The erosion and sedimentation control plan must be available at the development site. When required, all permits allowing earth moving activity shall be obtained by the developer before any construction on the development site shall begin.

3. Approval of an erosion and sedimentation plan by the municipality shall not be construed as an indication that the plan complies with the standards of any agency of the Commonwealth of Pennsylvania.

4. If the developer proposes to use a wetlands for stormwater treatment and control, the Township in its review of the drainage plan shall evaluate:

   a. If dredging or filling are proposed, the adverse effects of the dredging or filling on the treatment capability of the wetland.

   b. If the normal range of water level fluctuation of the wetland as it existed prior to construction of the wetlands stormwater discharge facility, is adversely affected. Normal range of water level fluctuation is defined as the maintenance of the fluctuating water surface changes between the normal low water and the normal high water of the wetland system so as to prevent the desiccation or over impoundment of the wetland.

   c. The discharge method of stormwater into the wetlands. The discharge shall be such that channelized flow of stormwater is minimized by employing methods including, but not limited to, sprinklers, overland flow, or spreader swales.

APPENDIX D

APPENDIX D

DESIGN OF OUTLET PROTECTION

Outlet protection as presented here is a level apron of sufficient length and flare such that the expanding flow (from pipe or conduit to channel) loses sufficient velocity and energy that it will not erode the next downstream channel reach. The design curves are based on circular conduits flowing full. The curves provide the apron size and if riprap is to be used, the minimum d_{50} size for the riprap. There are two curves, one for a low or minimum tailwater condition and the other a high or maximum tailwater condition. The minimum condition applies to a tailwater surface elevation less than the center of the pipe whereas the maximum condition applies to a tailwater surface elevation equal to or higher than the center of the pipe.

The first requirement in using this procedure is to determine the tailwater condition as required in the Standard and Specifications. Then, for circular conduits, enter the appropriate chart with the discharge and the pipe diameter to find the riprap size and apron length. Then calculate apron width.

Example 1:

A circular conduit is flowing full
Q = 280 cfs, diam. = 66", and tailwater (surface) is 2 ft. above pipe invert.

This is a minimum tailwater condition.
Read d_{50} = 1.2', and apron length = 38'
Apron width = diam + L_a = 38 + 5.5 = 43.5'
Maximum stone size in the riprap mixture = 1.5 x d_{50} = 1.5 x 1.2 = 1.8'.

The curves may also be used for the design of outlet protection for rectangular conduits but the procedure is slightly different. Depth of flow and velocity are the two flow parameters to be used. Enter the lower set of curves with velocity and depth (using the diameter curves for depth), then read to the right to find d_{50} and up and left for the length of apron. To find the apron width substitute conduit width for diameter in the apron width equations.

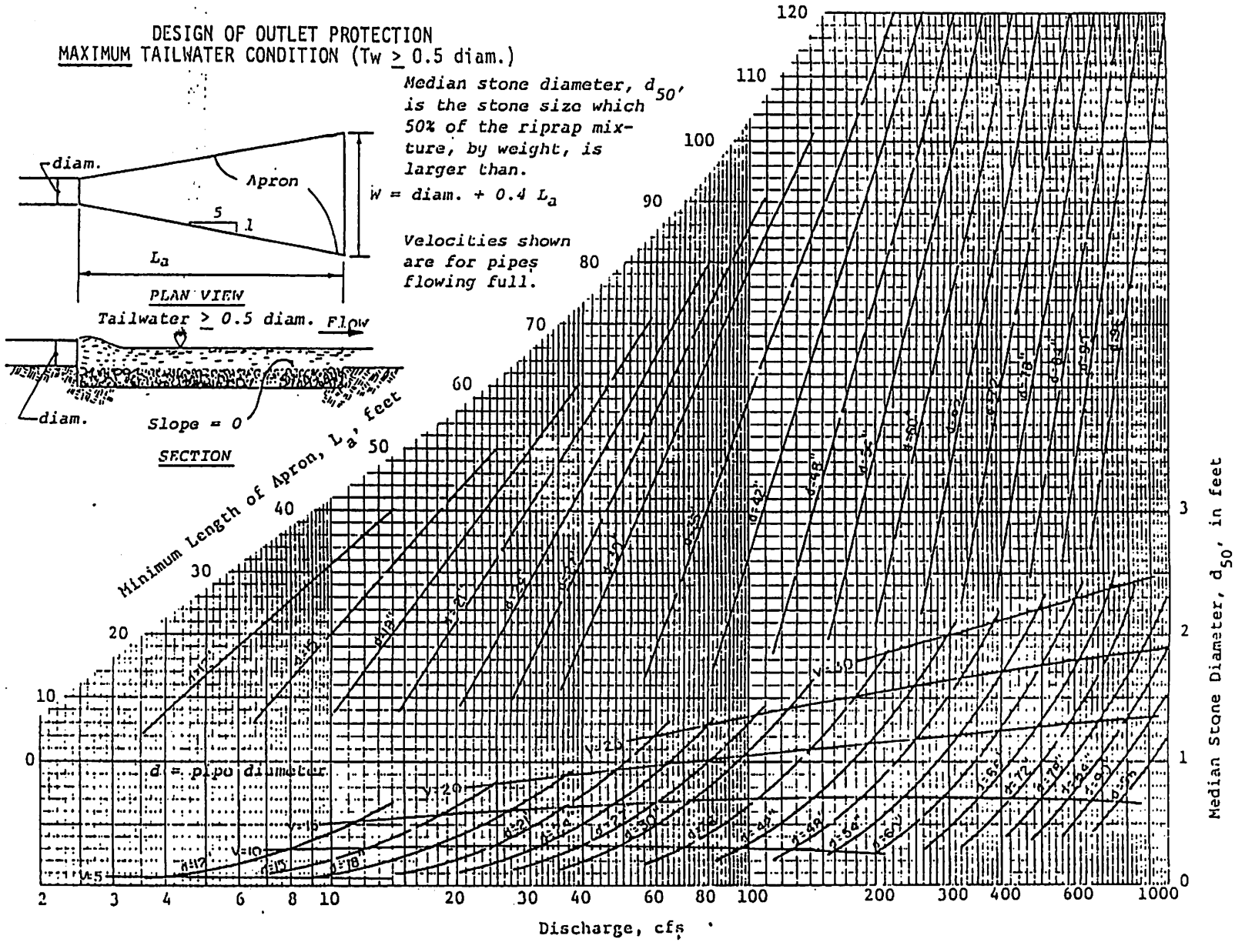
Example 2:

A concrete box 5.5' x 10' is flowing 5.0' deep, Q = 600 cfs and tailwater surface 5' above invert (Max. tailwater condition).

$$V = \frac{Q}{A} = \frac{600}{5.0 \times 10} = 12 \text{ fps}$$

At the intersection of the curve d=60" and V=12 fps, read d_{50} = 0.4'.

Then reading up to the d = 60" curve, read apron length = 40'.
Apron width, W = conduit width + 0.04 L_a = 10+(0.4)(40) = 26',
Largest stone size = 0.4 x 1.5 = 0.6' or 7"


DESIGN OF OUTLET PROTECTION
MAXIMUM TAILWATER CONDITION (Tw ≥ 0.5 diam.)
Median stone diameter, d50, is the stone size which 50% of the riprap mixture, by weight, is larger than.
W = diam. + 0.4 La
Velocities shown are for pipes flowing full.
diam.
Apron
5
1
La
PLAN VIEW
Tailwater ≥ 0.5 diam.
Flow
diam.
Slope = 0
SECTION
Minimum Length of Apron, La, feet
Median Stone Diameter, d50, in feet
Discharge, cfs
d = pipe diameter
V=20
V=15
V=10
V=5
0
10
20
30
40
50
60
70
80
90
100
110
120
0
1
2
3
2
3
4
6
8
10
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30
40
60
80
100
200
300
400
600
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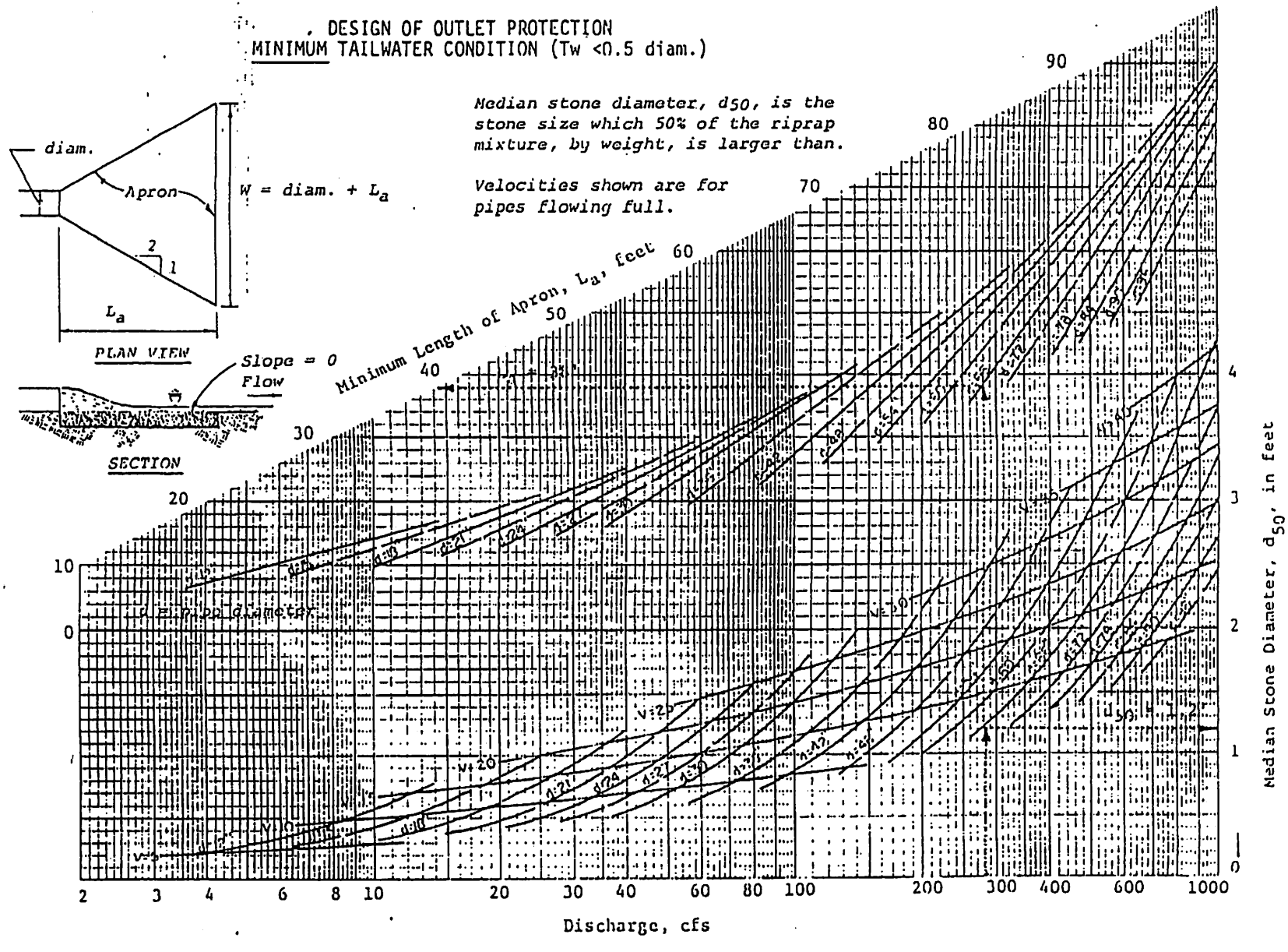
DESIGN OF OUTLET PROTECTION
MINIMUM TAILWATER CONDITION (Tw <0.5 diam.)
Median stone diameter, d50, is the stone size which 50% of the riprap mixture, by weight, is larger than.
Velocities shown are for pipes flowing full.
diam.
Apron
W = diam. + La
2
1
La
PLAN VIEW
Slope = 0
Flow
SECTION
Minimum Length of Apron, La, feet
10
20
30
40
50
60
70
80
90
0 = Pipe diameter
V=10
V=20
V=30
d=10
d=20
d=30
d=40
d=50
d=60
d=70
d=80
d=90
2
3
4
6
8
10
20
30
40
60
80
100
200
300
400
600
1000
Discharge, cfs
0
1
2
3
4
Median Stone Diameter, d50, in feet

ORDINANCE NO._____
AMENDING THE
SUBDIVISION AND LAND DEVELOPMENT
ORDINANCE
OF
JEFFERSON TOWNSHIP
LACKAWANNA COUNTY, PENNSYLVANIA

AN ORDINANCE AMENDING THE JEFFERSON TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCE ADOPTED APRIL 2, 1990, TO REGULATE STORMWATER CONTROL BY INCORPORATING BY REFERENCE THE JEFFERSON TOWNSHIP STORMWATER MANAGEMENT ORDINANCE.

Be it ordained and enacted by the Board of Supervisors of Jefferson Township, Lackawanna County, Pennsylvania that the Jefferson Township Subdivision and Land Development Ordinance of April 2, 1990 is hereby amended as follows:

ITEM 1 - Amend Article 6, DESIGN STANDARDS, Section 6.502, Stormwater Management requirements of the Township Subdivision and Land Development Ordinance to read as follows:

ARTICLE 6 - DESIGN STANDARDS

SECTION 6.502 - Stormwater Management Requirements

Soil erosion and sedimentation control practices and stormwater management planning and facilities for all subdivisions and land developments regulated by this Ordinance shall comply with the requirements of the Township Stormwater Management Ordinance, Ordinance No. _____ as amended. In addition to the plan reviews by the Township Solicitor, Township Engineer, the County Planning Commission and the County Conservation District as required by this Ordinance, the Township may submit subdivision and land development plans along with soil erosion and sedimentation control and stormwater management plans to the Lake Wallenpaupack Watershed Management District for review and comment.

This Amendment to the Jefferson Township Subdivision and Land Development Ordinance is hereby ordained and enacted by vote of the Board of Supervisors of Jefferson Township, Lackawanna County, Pennsylvania at a duly convened meeting of the Board of Supervisors this 7th day of September, 1993.

This Ordinance shall become effective on September 7, 1993.

ATTEST:

Leona E Gallagher
Secretary

Jefferson Township Board of Supervisors

Chairman

Vice-Chairman

Supervisor

Solicitor

ORDINANCE NO._____
JEFFERSON TOWNSHIP
LACKAWANNA COUNTY, PENNSYLVANIA

AN ORDINANCE AMENDING THE JEFFERSON TOWNSHIP ZONING ORDINANCE TO REGULATE STORMWATER CONTROL BY INCORPORATING BY REFERENCE THE JEFFERSON TOWNSHIP STORMWATER MANAGEMENT ORDINANCE, TO ADDRESS ACCESSORY STRUCTURE SETBACKS ON LAKEFRONT LOTS, AND TO SET EXPIRATION DATES FOR ZONING PERMITS.

Be It Ordained and Enacted by the Board of Supervisors of Jefferson Township, Lackawanna County, Pennsylvania that the Jefferson Township Zoning Ordinance is hereby amended as follows:

♦ ***ITEM 1 - AMEND ARTICLE 6 TO INCLUDE SECTION 6.800 AS FOLLOWS:***

SECTION 6.800 Activities Regulated by the Township Stormwater Management Ordinance

The uses listed below which are regulated by the Jefferson Township Stormwater Management Ordinance, as amended, and set forth at Section 404, Subsection B of said Ordinance, shall also require a zoning permit issued in accord with the requirements in this Zoning Ordinance for principal permitted uses, unless the use proposed is otherwise regulated by this Zoning Ordinance as a conditional use or special exception, in which case it shall be processed in accord with the applicable provisions.

1. General land disturbance activities, including clearing, filling, and excavating
2. Agricultural Operations
3. Construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc...)
4. Construction of new buildings and structures or additions to existing buildings and structures not regulated as land developments by the Township Subdivision and Land Development Ordinance.
5. Forest management operations and nursery operations.
6. Diversion or piping of any natural or man-made drainage channel.
7. Installation of stormwater systems or appurtenances thereto.

Application shall be made to the Township and said application shall contain all information required by Section 403 of the Stormwater Management Ordinance or as otherwise required by the Township to determine compliance with the Stormwater Management Ordinance and this Zoning Ordinance. A minimum of five (5) copies of the application and associated documentation shall be submitted, however, the Township may require additional copies. The Township may submit the application to any or all of the following individuals/agencies for review and comment:

1. Township Board of Supervisors
2. Township Planning Commission
3. Township Engineer
4. Township Solicitor
5. County Conservation District
6. County Planning Commission
7. Lake Wallenpaupack Watershed Management District

◆ *ITEM 2 - ADD THE FOLLOWING SUBSECTION (e) TO SECTION 6.109, ACCESSORY STRUCTURES AND USES:*

(e) Lakefront Yard Requirements. In cases where the side or rear lot line of a parcel is comprised of a pond or lake, the side and rear yard setbacks established by this Zoning Ordinance for accessory structures shall not apply to docks and shall not apply to accessory structures with an area of one hundred and fifty (150) square feet or less, including boat houses, sheds, gazebos, and walkways, but not including garages. Nevertheless, the applicant shall provide documentation that the proposed accessory structure complies with all other Township, State and Federal regulations governing floodplains and setbacks from watercourses and waterbodies. Where applicable, the applicant shall also provide evidence of deeded "lake front rights" authorizing the placement of accessory structures.

◆ *ITEM 3 - ADD THE FOLLOWING SUBSECTION (e) TO SECTION 7.401, ZONING PERMITS:*

(e) Expiration of Permits. If work on any construction authorized by a Zoning Permit is not initiated, or the use permitted by a Zoning Permit is not established, within six (6) months of the date of issuance of the Zoning Permit, said permit shall expire, and a new Zoning Permit shall be required prior to commencing any construction or establishing any use. If work on any authorized construction is initiated within the six (6) month period, but is not completed within two (2) years of the date of Zoning Permit issuance, said Zoning Permit shall expire. Zoning Permits may be extended by the Board of Supervisors for one (1) term of one (1) year if application for same is made prior to the expiration date. In the case where a new Zoning Permit is issued to replace an expired Permit, the applicant shall pay the required fee.

THIS ORDINANCE, amending the Jefferson Township Zoning Ordinance, is hereby Ordained and Enacted by vote of the Board of Supervisors of Jefferson Township, Lackawanna County, Pennsylvania at a duly convened meeting of the Board of Supervisors this 7th day of September, 1993 to be become effective immediately.

JEFFERSON TOWNSHIP BOARD OF SUPERVISORS

Chairman

Vice-Chairman

Supervisor

ATTEST:

Secretary