320 Attachment 1

Rye Township

Appendix A
Application Form
for Subdivision/Land Development Approval
Office (717) 957-2348 Fax (717) 957-9419

Subdivision Name and Number: _____
Subdivision Location/Address: _____
Tax Parcel No(s) _____
Record of Deed: **Book/Instrument No:** _____ Page No: _____
Type of Submission:

_____ Preliminary Plan
_____ Preliminary/Final Plan
_____ Final Plan
_____ Sketch Plan
_____ Minor Subdivision
_____ Land Development

CURRENT OWNER(S) OF RECORD: _____
(Name(s) as it appears on deed)
Address: _____
Phone(s): _____

APPLICANT'S NAME: _____
Phone(s): _____
Address: _____

SURVEYOR/ENGINEER: _____
Contact Person: _____ Phone: _____ Fax: _____

*******Provide a general description of the proposed project on reverse side of this form*******

Existing # of lots _____ Proposed # of lots _____ Proposed # of Dwellings _____
Total Acreage _____ Public Water _____

SUBMISSION INCLUDES:

2 Signed/Dated Applications	_____
12 sets of plans	_____
3 sets of construction plans	_____
3 copies planning module	_____
1 module exemption card	_____
2 sets storm water plans/calculations	_____
2 sets of E & S Control plans	_____
Fees (Payable to "Rye Township")	_____

Application shall be considered incomplete if any of the above checklist items, when applicable, are not addressed.

I hereby certify that all information on both sides of this application and any attachments thereto are true and correct.

Applicant's Signature: _____ Title: _____

Print Name: _____ Date of Application: _____

****

(Township Use Only)

Date Rec'd by Twp: _____
Admin Review: _____
Action Deadline Date: _____
Extension Request: _____
Filing Fee _____
Security Deposit _____
Engineering Fee _____
Approval Date: _____

320 Attachment 2

Rye Township

Appendix B
Preliminary Plan Submission Checklist

Included	N/A	Item Description
☐		Check payable to Rye Township in the applicable amount to cover the application fee
☐		Plans shall be on sheet sizes no larger than 24 inches by 36 inches and drawn to a scale not smaller than one inch equals 100 feet
☐		Include the designation "Preliminary Plan"
☐		Indicate proposed project name
☐		Indicate north arrow
☐		Indicate graphic scale
☐		Indicate written scale
☐		Indicate date, including the month, day and year that the original drawing was completed
☐	☐	Indicate month, day and year that the original drawing was revised, for each revision, if any
☐		Indicate name and address or record owner
☐	☐	Indicate name of developer if different from owner
☐		Indicate name of the proposed subdivision
☐		Indicate name and address of the Pennsylvania Registered Professional Engineer certifying engineering aspects of the plan
☐		Indicate names of all abutting property owners and respective deed references
☐		Include a location map
☐		Indicate boundaries of the property being subdivided showing bearings and distances
☐		Include state of total acreage of the property
☐	☐	Indicate purpose for which sites other than buildable lots are dedicated or reserved
☐		Include zoning data
☐	☐	Indicate existing buildings or other structures and cultural features
☐	☐	Indicate existing accessed, right-of-ways, and driveways, existing streets

Included	N/A	Item Description
☐	☐	Indicate location, width and purpose of existing casements and utility right-of-ways within 200 feet of the proposed subdivision tract
☐		Indicate location of all percs and probes listing bearings and distances to the nearest lot corner
☐		Indicate acceptable probes with an open triangle symbol Δ
☐		Indicate unacceptable probes with a shaded triangle symbol ▲
☐	☐	Indicate watercourses and drainage features (streams, lakes, ponds, springs, etc.)
☐	☐	Indicate soil types pursuant to "Soil Survey of Cumberland and Perry Counties, Pennsylvania"
☐	☐	Indicate wetlands, identified and delineated pursuant to Chapter 105 "Water Obstruction and Encroachment"
☐	☐	Indicate forested, wooded areas, and isolated tree masses
☐	☐	Indicate slope areas between 15% and 25%
☐	☐	Indicate slope areas greater than 25%
☐	☐	Indicate location of all cut and fill slope limits
☐	☐	Indicate existing and proposed contours of the proposed project at vertical intervals of five feet in those areas where construction is proposed
☐	☐	Indicate existing contour at ten-foot intervals for the undeveloped portion of the property
☐	☐	Indicate contour lines at vertical intervals of not more than two feet for land with average natural slope of 4% or less
☐	☐	For land subject to flooding indicate the following:
☐		1. Location and elevation of proposed roads, utilities, building sites, fills, flood
☐		2. The one-hundred-year flood boundaries and elevations
☐		3. Areas subject to special deed restrictions
☐	☐	Indicate the names, typical cross section, and widths of right-of-way, cartway and paving of proposed streets, alleys and easements
☐	☐	Indicate location and width of all streets and rights-of-way with a statement of any conditions governing their use
☐	☐	Indicate suggested street names
☐	☐	Indicate easement and right-of-way locations, purpose and stipulations
☐		Indicate building setback lines on all lots and other sites
☐		Indicate lot lines with approximate dimensions

Included	N/A	Item Description
☐	☐	Indicate a statement of the intended use of all non-residential lots and parcels
☐		Indicate lot numbers, a statement of total number of lots and parcels and the lot size in square feet or acres for each lot
☐	☐	Indicate sanitary and/or storm sewers (and other drainage facilities), with the size and material of each indicated, and any proposed connections with existing facilities
☐	☐	Indicate parcels of land intended to be dedicated or reserved for schools, parks, playgrounds, parking areas, common open space, either public, semi-public or community purposes
☐	☐	Indicate location, width, and purpose of proposed easements and utility right-of-ways
☐	☐	Indicate proposed natural features to be preserved with reference to and provision of proposed deed restrictions
☐	☐	Include a plan for providing utility service
☐	☐	For phased projects included a map delineating each stage or section of the proposed subdivision or land development consecutively numbered so as to illustrate phasing of development
☐	☐	Include four copies of a formal supplement or revision to the Township's official Liquid Wastes Disposal Plan and four copies of any required supporting data
☐		Include four copies of an Erosion and Sediment Pollution Control Plan
☐		Include Preliminary Storm Water Management and Erosion and Sediment Pollution Control Plans and supporting computations
☐	☐	Include preliminary profiles and specifications for proposed street, sanitary sewer, water system improvements and storm drainage
☐	☐	Include preliminary designs of any bridges or culverts
☐	☐	Include Soils Engineering and Geophysical Hydrologic Reports as required under Section 714 of this Ordinance
☐	☐	Include Traffic Impact Study
☐	☐	Include school district letter containing the review and comments of the school district on the proposed development for subdivisions or developments with 100 or more dwelling units
☐	☐	Include a letter from the Pennsylvania Natural Diversity Inventory Office regarding wildlife habitat
☐	☐	Include a list of any requested alterations of requirements identifying the pertinent section of the ordinance and justification for the request for alteration.

320 Attachment 3

Rye Township

Appendix C
Final Plan Submission Checklist

Included	N/A	Item Description
☐		Check payable to Rye Township in the applicable amount to cover the application fee
☐		Plans shall be on sheet sizes no larger than 24 inches by 36 inches and drawn to a scale not smaller than one inch equals 100 feet
☐		Include the designation "Final Plan" subdivision name
☐		Indicate proposed and existing tract boundary lines, right-of-way lines of streets, easements, and other right-of-ways, and property lines of residential lots and other sites
☐	☐	Indicate name and right-of-way width of each street or other right-of-way
☐	☐	Indicate location, dimensions, and purpose or easements, proposed and existing
☐	☐	Indicate number to identify each lot and/or site
☐	☐	Indicate purpose for which sites other than buildable lots are dedicated or reserved and appropriate covenants establishing ownership and maintenance responsibility
☐		Indicate building setback lines on all lots and other sites
☐	☐	Indicate location and description of all permanent survey monuments by an "X" on the plan
☐	☐	Indicate names of record owners of unplatted land
☐	☐	Indicate reference to abutting property owners by name, deed book and page
☐		Indicate name and address of the Pennsylvania Registered Professional Engineer certifying engineering aspects of the plan
☐		Indicate certification of title showing the applicant is owner of land, agent of the land owner or tenant with permission of the landowner
☐	☐	Indicate statement by the owner dedicating streets, right-of-ways and any sites for public uses
☐		Indicate a signature block for certification of approval of the plan by the Township Planning Commission and Township Supervisors
☐	☐	Indicate permit numbers. When applicable a note shall be placed on the plan which reads:

Included	N/A	Item Description
		"Highway Occupancy Permits have been secured for this plan which requires access to a highway under the jurisdiction of the Pennsylvania Department of Transportation, pursuant to S 420 of the Act of June 1, 1945 (P.L., No. 428), known as the State Highway Law."
☐	☐	When applicable indicate a note on the plan regarding the presence of wetlands
☐	☐	When any portion of the tract proposed for subdivision or land development is located within an identified flood district or flood plain area, indicate information in accordance with the SALDO.
☐	☐	When applicable include statements indicated that prohibitive slope lots and steep slope lot areas are subject to the restriction identified in the SALDO
☐	☐	Indicate parks, playgrounds and other areas proposed to be dedicated or reserved for public or common use, with any conditions governing such use
☐	☐	Indicate all approved alterations or modifications to the Rye Township Subdivision and Land Development Ordinance by noting the Article and Section number on the Final Plan
☐	☐	Include improvement construction plan
☐	☐	Include documentation from the Sewage Enforcement Officer that each lot has been tested and permitted for on-lot sewage systems
☐	☐	Include a detailed description of the methods the developer is using to avoid disturbing wetlands
☐	☐	Include traffic impact study
☐	☐	Include private deed restrictions or protective covenants, as may be imposed upon the property as a condition to sale, together with a statement of any restriction previously imposed which may affect the title to the land being subdivided
☐	☐	Include a copy of the Maintenance Agreement for permanent erosion and sediment pollution control, storm water management facilities, and private drives

320 Attachment 4

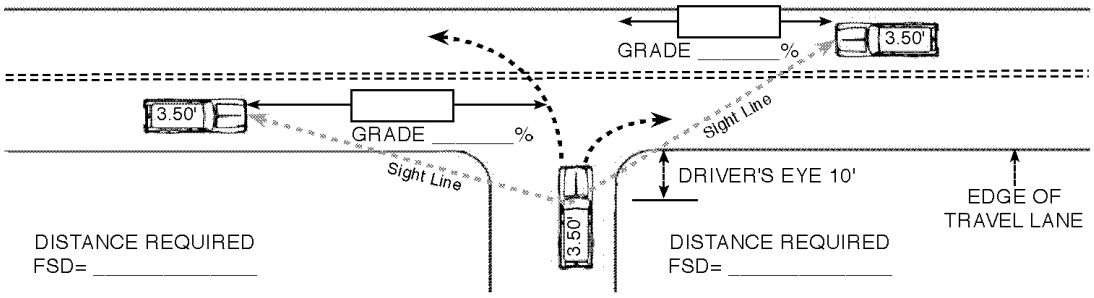
Rye Township

Appendix D
Minimum Safe Stopping Sight Distances

Driveway Sight Distance Measurements
(for local roads, use PennDOT Pub 70)

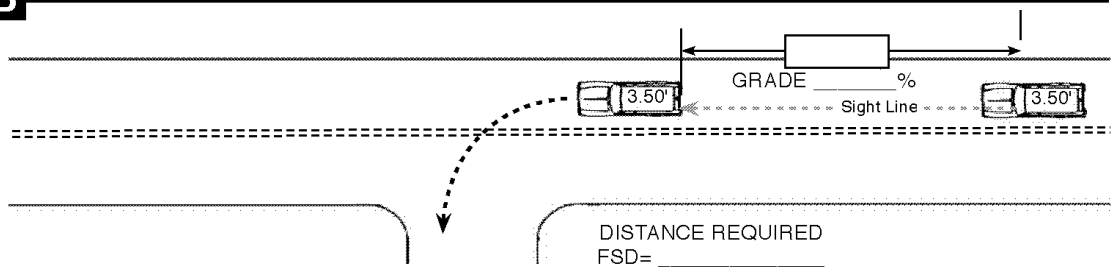
APPLICANT _____ APPLICATION NO. _____
S.R._____ SEG._____ OFFSET_____ LEGAL SPEED LIMIT _____
MEASURED BY_____ DATE _____
FOR DEPARTMENT USE ONLY: Safe-Running Speed _____ 85th Percentile Speed _____

A



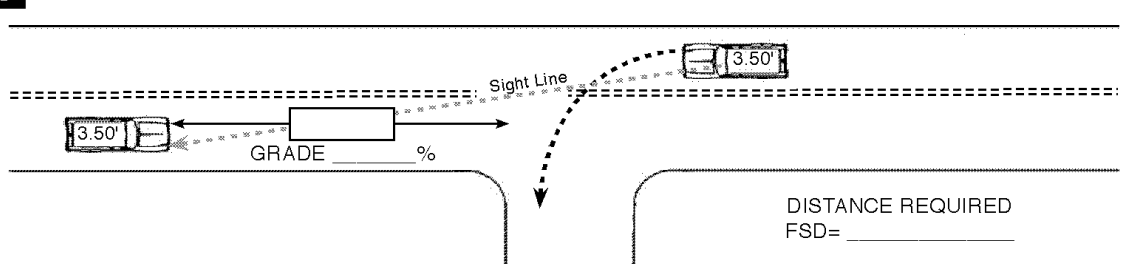
THE MAXIMUM LENGTH OF ROADWAY ALONG WHICH A DRIVER AT A DRIVEWAY LOCATION CAN CONTINUOUSLY SEE ANOTHER VEHICLE APPROACHING ON THE ROADWAY.

B



THE MAXIMUM LENGTH OF ROADWAY ALONG WHICH A DRIVER ON THE ROADWAY CAN CONTINUOUSLY SEE THE REAR OF A VEHICLE WHICH IS LOCATED IN THE DRIVER'S TRAVEL LANE AND WHICH IS POSITIONED TO MAKE A LEFT TURN INTO A DRIVEWAY.

C



THE MAXIMUM LENGTH OF ROADWAY ALONG WHICH A DRIVER OF A VEHICLE INTENDING TO MAKE A LEFT TURN INTO A DRIVEWAY CAN CONTINUOUSLY SEE A VEHICLE APPROACHING FROM THE OPPOSITE DIRECTION.

Formula Sight Distance Table

Speed (V) (miles per hour)	Average Grade (G) (percent)										
	Use plus grades when approaching vehicle is traveling upgrade.										
	0.0	+1.0	+2.0	+3.0	+4.0	+5.0	+6.0	+7.0	+8.0	+9.0	+10.0
25	147	145	144	143	142	140	139	138	137	136	135
30	196	194	191	189	187	185	183	182	180	178	177
35	249	245	242	239	236	233	231	228	226	224	221
40	314	309	304	299	295	291	287	284	280	277	274
45	383	376	370	364	358	353	348	343	339	334	330
50	462	453	444	436	429	422	415	409	403	397	392
55	538	527	517	508	499	490	482	475	468	461	454
	Use negative grades when approaching vehicle is traveling downgrade.										
	0.0	-1.0	-2.0	-3.0	-4.0	-5.0	-6.0	-7.0	-8.0	-9.0	-10.0
25	147	148	150	151	153	155	157	159	161	164	166
30	196	199	201	204	207	210	214	217	221	226	230
35	249	252	256	260	265	269	275	280	286	292	299
40	314	319	325	331	338	345	352	360	369	379	389
45	383	390	398	406	415	425	435	447	459	472	487
50	462	471	481	492	504	517	531	546	563	581	600
55	538	550	562	576	590	606	622	641	661	682	706

320 Attachment 5

Rye Township

Appendix E
Stormwater Management

Section 1. Stormwater Management Computational Values.

The National Oceanic and Atmospheric Administration's (NOAA) current Atlas 14 Point Precipitation Frequency Estimates.

Table E-2
Runoff Curve Numbers and Average Imperviousness for Various Land Uses by Hydrologic Soil Group

TR-55

Cover Description Land Use/Cover Type	Average Imperviousness (%)	Curve Numbers For Hydrologic Soil Group			
		A	B	C	D
Open space (lawns, parks, golf courses, cemeteries, etc.)					
Good condition (grass cover greater than 75%)	n/a[a]	39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	n/a	98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)	n/a	98	98	98	98
Paved; open ditches (including right-of-way)	n/a	98	98	98	98
Gravel (including right-of-way)		76	85	89	91
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 (townhouses)	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
Woods:	n/a	30	55	70	77
Brush:		35	56	70	77
Meadow:		30	58	71	78

[a] Not applicable.

Source: U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, 1986, "Urban Hydrology for Small Watersheds," Technical Release 55, Washington, DC.

Table E-3
Runoff Coefficients for the Rational Formula
by Hydrologic Soil Group and Overland Slope (%)

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

[a] Runoff coefficients for storm recurrence intervals less than 25 years.
[b] Runoff coefficients for storm recurrence intervals of 25 years or more.

Table E-4
Manning Roughness Coefficients

	Manning's n Range
I. Closed Conduits:	
A. Concrete pipe	0.011-0.013
B. Corrugated-metal pipe or pipe arch:	
1. 2-2/3 by 1/2 in, corrugation (riveted pipe):	
a. Plain or fully coated	0.024
b. Paved invert (range values are for 25% and 50% of circumference paved):	
(1) Flow full depth	0.021-0.018
(2) Flow 0.8 depth	0.021-0.016
(3) Flow 0.6 depth	0.019-0.013
2. 6 by 2-in corrugation (field bolted)	0.030
C. Cast-iron pipe, uncoated	0.024
D. Steel pipe	0.009-0.011
E. Monolithic concrete:	
1. Wood forms, rough	0.015-0.017
2. Wood forms, smooth	0.012-0.014
3. Steel forms	0.012-0.013
F. Cemented rubble masonry walls:	
1. Concrete floor and top	0.017-0.022
2. Natural floor	0.019-0.025
II. Open Channels, Lined (straight alignment):	
A. Concrete with surfaces as indicated:	
1. Formed, no finish	0.013-0.017
2. Trowel finish	0.012-0.014
3. Float finish	0.013-0.015
4. Float finish, some gravel on Bottom	0.015-0.017
5. Gunite, good section	0.016-0.019
6. Gunite, wavy section	0.018-0.022
B. Concrete, bottom float finished, sides as indicated:	
1. Dressed stone in mortar	0.015-0.017
2. Random stone in mortar	0.017-0.020
3. Cement rubble masonry	0.020-0.025
4. Cement rubble masonry, Plastered	0.016-0.020
5. Dry rubble (riprap)	0.020-0.030
C. Gravel bottom, sides as indicated:	
1. Formed concrete	0.017-0.020

	Manning's n Range
2. Random stone in mortar	0.020-0.023
3. Dry rubble (riprap)	0.023-0.033
D. Asphalt:	
1. Smooth	0.013
2. Rough	0.016
E. Concrete-lined excavated rock:	
1. Good section	0.017-0.020
2. Irregular section	0.022-0.027
III. Open Channels, Excavated (straight alignment, natural lining):	
A. Earth, uniform section:	
1. Clean, recently completed	0.016-0.018
2. Clean, after weathering	0.018-0.020
3. With short grass, few weeds	0.022-0.027
4. In gravelly soil, uniform section, clean	0.022-0.025
B. Earth, fairly uniform section:	
1. No vegetation	0.022-0.025
2. Grass, some weeds	0.025-0.030
3. Dense weeds or aquatic plants in deep channels	0.030-0.035
4. Sides clean, gravel bottom	0.025-0.030
5. Sides clean, cobble bottom	0.030-0.040
C. Dragline excavated or dredged:	
1. No vegetation	0.028-0.033
2. Light brush on banks	0.035-0.050
D. Rock:	
1. Based on design section	0.035
2. Based on actual mean section:	
a. Smooth and uniform	0.035-0.040
b. Jagged and irregular	0.040-0.045
E. Channels not maintained, weeds and brush uncut:	
1. Dense weeds, high as flow depth	0.080-0.120
2. Clean bottom, brush on sides	0.050-0.080
3. Clean bottom, brush on sides, highest stage of flow	0.070-0.110
4. Dense brush, high stage	0.100-0.140
IV. Channels and Swales w/Maintained Vegetation (Values shown are for velocities of 2 and 6 f.p.s.):	
A. Depth of flow up to 0.7 foot:	
1. Bermuda grass, Kentucky bluegrass. Buffalo grass	
a. Mowed to 2 inches	0.045-0.070

	Manning's n Range
b. Length 4-6 inches	0.050-0.090
2. Good stand, any grass:	
a. Length about 12 inches	0.090-0.180
b. Length about 24 inches	0.150-0.300
3. Fair stand, any grass:	
a. Length about 12 inches	0.080-0.140
b. Length about 24 inches	0.130-0.250
B. Depth of flow 0.7-1.5 feet:	
1. Bermudagrass, Kentucky bluegrass Buffalograss:	
a. Mowed to 2 inches	0.035-0.050
b. Length 4 to 6 inches	0.040-0.060
2. Good stand, any grass:	
a. Length about 12 inches	0.070-0.120
b. Length about 24 inches	0.100-0.200
3. Fair stand, any grass:	
a. Length about 12 inches	0.060-0.100
b. Length about 24 inches	0.090-0.170
V. Street and Expressway Gutters:	
A. Concrete gutter, troweled finish	0.012
B. Asphalt pavement:	
1. Smooth texture	0.013
2. Rough texture	0.016
C. Concrete gutter with asphalt Pavement	
1. Smooth	0.013
2. Rough	0.015
D. Concrete pavement:	
1. Float finish	0.014
2. Broom finish	0.016
E. For gutters with small slope, where sediment may accumulate, increase above values of x by 0.002	
VI. Natural Stream Channels:	
A. Minor streams (surface width at flood stage less than 100 feet):	
1. Fairly regular section:	
a. Some grass and weeds, little or no brush	0.030-0.035
b. Dense growth of weeds, depth of flow materially, greater than weed height	0.035-0.050
c. Some weeds, light brush on banks	0.035-0.050
d. Some weeds, heavy brush on banks	0.050-0.070

	Manning's n Range
e. Some weeds, dense willows on banks	0.060-0.080
f. For trees within channel with branches submerged at high stage, increase all above values by	0.010-0.020
2. Irregular sections, with pools, slight channel meander; increase values given in la-e about	0.010-0.020
3. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stage	
a. Bottom of gravel, cobbles and few boulders	0.040-0.050
b. Bottom of cobbles, with large boulders.	050-0.070
B. Flood plains (adjacent to natural streams):	
1. Pasture, no brush:	
a. Short grass	0.030-0.035
b. High grass	0.035-0.050
2. Cultivated areas:	
a. No crop	0.030-0.040
b. Mature row crops	0.035-0.045
c. Mature field crops	0.040-0.050
3. Heavy weeds, scattered brush	0.050-0.070
4. Light brush and trees:	
a. Winter	0.050-0.060
b. Summer	0.060-0.080
5. Medium to dense brush:	
a. Winter	0.070-0.110
b. Summer	0.100-0.160
6. Dense willows, summer, not bent over by current	0.150-0.200
7. Cleared land w/tree stumps, 100 to 150 per acre:	
a. No sprouts	0.040-0.050
b. With heavy growth of Sprouts	0.060-0.080
8. Heavy stand of timber, a few down trees, little undergrowth:	
a. Flood depth below branches	0.100-0.120
b. Flood depth reaches branches	0.120-0.160
C. Major streams (surface width at flood stage more than 100 feet): Roughness coefficient is usually less than for minor streams of similar description on account of less effective resistance offered by irregular banks or vegetation on bank. Values of n may be somewhat reduced. Follow recommendation in publication cited if possible. The value of n for larger streams of most regular section, with no boulders or brush, may be in the range of	0.028-0.033

Source: Chow, V.T., 1959, “Open Channel Hydraulics,” McGraw Hill, New York.

Table E-5a
Maximum Permissible Velocities in Bare Earth Channels
for Straight Channels where slope less than 0.02 feet/feet

Soil Materials	'n'*	Clear Water (V fps)	Water Transporting Colloidal Silts (V fps)
Fine sand, noncolloidal	0.020	1.50	2.50
Sandy loam, noncolloidal	0.020	1.75	2.50
Silt loam, noncolloidal	0.020	2.00	3.00
Alluvial silts, noncolloidal	0.020	2.00	3.50
Ordinary firm loam	0.020	2.50	3.50
Stiff clay, very colloidal	0.025	3.75	5.00
Alluvial silts, colloidal	0.025	3.75	5.00
Shales and hardpan	0.025	6.00	6.00
Fine gravel	0.020	2.50	5.00
Graded loam – cobbles (when noncolloidal)	0.030	3.75	5.00
Graded silt – cobbles (when noncolloidal)	0.030	4.00	5.50
Coarse gravel, noncolloidal	0.025	4.00	6.00
Cobbles and shingles	0.035	5.00	5.50

* Listed 'n' values assume good to excellent construction techniques which produce uniform channel dimensions. Values should be adjusted, by use of SCS Engineering Handbook #5, Supplement B, for other construction conditions.

Table E-5b
Maximum Permissible Velocities for Channels Lined with Vegetation

Cover	Slope Range Percent	Permissible Velocity feet/sec.	
		Erosion[1] Resistant Soil	Easily[2] Eroded Soil
Kentucky Bluegrass Tall Fescue	<5 5-10 >10	7[3] 6[3] 5	5 4 3
Grass Mixture Reed Canarygrass	<5 5-10	5 4	4 3
Sericea Lespedeza Weeping Lovegrass Redtop Red Fescue	<5	3.5	2.5
Annuals temporary cover only Sudangrass	<5	3.5	2.5

[1] Cohesive (clayey) fine grain soils and coarse grain soils with a plasticity index of 10 to 40 (CL, CH, SC, and GC).
[2] Soils that do not meet the requirements for erosion resistant soils.
[3] Use velocities exceeding five feet/section only where good cover and proper maintenance can be obtained

Table-5c
Maximum Permissible Velocities for Rock Lined Channels and Riprap

NSA No.	Graded Rock Size (inches)			Permissible Velocity fps*
	Maximum	D_{50}	Minimum	
R-1	1.5	0.75	No. 8	2.5
R-2	3	1.5	1	4.5
R-3	6	3	2	6.5
R-4	12	6	3	9.0
R-5	18	9	5	11.5
R-6	24	12	7	13.0
R-7	30	15	12	14.5

* Permissible velocities based on rock at 165 lbs. per cubic foot. Adjust velocities for other rock weights used.

Table E-5d
Maximum Permissible Velocities for Reno Mattress & Gabions

Type	'N'	Thickness (inches)	Rock fill Gradiation (inches)	Permissible* Velocity fps
Reno matress	0.25	6	3 to 6	13.5
	0.025	9	3 to 6	16.0
	0.025	12	4 to 6	18.0
Gabion	0.027	18+	5 to 9	22.0

* Permissible velocities may be increased by the introduction of sand mastic grout. Refer to manufacturer’s recommendations/specifications for permissible velocities.

Source: PA DER Bureau of Soil and Water Conservation Erosion and Sediment Pollution Control Program Manual, April 1990.

Section II. Design Criteria for Drainage Swales and Perennial Streams

A. Drainage Swales and Channels

1. Where vegetated drainage swales are used in lieu of or in addition to storm sewers, they shall be designed to carry the ten-year discharge without excessive erosion, and also to increase the time-of-concentration, reduce the peak discharge and velocity, and permit the water to percolate into the soil.

2. Swales provided in cut areas shall not encroach upon the shoulder during a ten-year frequency storm of five minutes duration. Frequent and/or sustained flooding of the subbase shall be avoided.

3. The maximum velocity as determined by Manning's equation shall not exceed the allowable velocity. Inlets shall be provided to control the shoulder encroachment and water velocity.

4. Erosion Prevention: All drainage swales and channels shall be designed to prevent the erosion of the bed and bank areas. The flow velocity in all vegetated drainage channels shall not exceed three feet per second to prevent erosion. Suitable stabilization shall be provided where required to prevent erosion during establishment of vegetation.

5. The side slope for any vegetated drainage channel requiring mowing of the vegetation shall have a maximum grade of three horizontal to one vertical on those areas to be mowed.

6. Storm sewers or drainage swales shall discharge to a detention or retention basin for the control of peak runoff discharge except as provided in the plan.

7. Design Standard: Because of the critical nature of vegetated drainage channels, the design of all vegetated channels shall, as a minimum, conform to the design procedures outlined in TP-61, "Handbook of Channel Design for Soil and Water Conservation" prepared by the Soil Conservation Service.

8. Deed restrictions shall be required on property(ies) containing drainage swales and/or perennial streams. These deed restrictions shall specify that no property owner obstruct or alter any drainage swale or perennial stream identified in the storm water management/erosion and sediment pollution control plan if such action would alter the rational course of runoff, without the approval of the Township.

B. Culverts and Drainage Channels

1. Design Flow Standard: Culverts and drainage channels shall be designed to carry flow rates as outlined in Article VII, § 320-37.

2. The maximum permissible flow velocity shall not exceed those outlined in Table E-5 of Section I, Appendix A.

3. A minimum grade of 1% shall be maintained for all channel flows.

4. Several acceptable sources outline procedures for non-vegetated drainage channels including the following:

   Bureau of Public Roads
   Hydraulic Engineering Circular No. 5
   Hydraulic Charts for the Selection of Highway Culverts

   Federal Highway Administration
   Hydraulic Engineering Circular No. 13
   Hydraulic Design of Improved inlets for Culverts

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

   United States Department of Commerce
   Bureau of Public Roads
   Hydraulic Engineering Circular No. 5
   Hydraulic Charts for the Selection of Highway Culverts

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

   Reference to publications and source documents in this section shall be deemed to include any amendments and revisions thereof.

6. Design of pipe culverts shall be in accordance with applicable design criteria contained in the following section: Storm Drainage Criteria Section III.A.

Section III. Storm Drain Criteria

A. Straight Pipe Sections

Wherever possible, all storm drain pipes shall be designed to follow straight courses. No angular deflections of storm sewer pipe sections in excess of 5° shall be permitted. No vertical curves shall be permitted in the storm drain pipe system. Storm pipes shall be either polymeric coated or aluminized corrugated metal pipe or reinforced cement concrete pipe.

1. Minimum Grade and Size – All storm drain pipes shall be designed to maintain a minimum grade of 0.5%. All storm drain pipes shall have a minimum inside diameter of 18 inches or a cross-sectional area of 254 square inches, except that pipes under a 15 feet or greater fill shall not be less than 24 inches or a cross-sectional area of 453 square inches, and shall consist of reinforced concrete.

2. Pipe Arches – Where depth or headroom is restricted, equivalent pipe arches may be used in lieu of circular pipe.

3. Minimum Cover – A minimum of two feet of cover shall be maintained over all storm pipes. In extreme cases, when approved by the Township Engineer, this minimum may be reduced, but in no case shall the top of the pipe be higher than 0.5% foot below the subgrade elevation of the roadway.

4. Cross pipes shall be perpendicular to the edge of the road.

5. Diversion of Runoff – Where required by the Township, all storm drain pipes shall be designed to carry the runoff into a detention basin or similar facility utilized to control the rate of runoff.

6. All storm drainage piping discharging to the ground surface shall be provided with either reinforced concrete headwalls or metal pipe and sections compatible with the pipe size involved. A riprap apron of adequate length shall be provided at all surface discharge points in order to minimize erosion. The apron shall extend to the crown of the pipe. Riprap size shall be determined by the flow velocity leaving the system as follows:

Flow Velocity (feet/second)	**Average Stone Size (inches)**
Up to 6	6 to 8
6 to 9	8 to 12
Greater than 9	Specialized design required

   All precautions should be taken to limit the discharge velocity from storm drainage systems to six feet per second. Baffle systems, drop manholes, or other appurtenances should be used to control velocity.

7. Where the construction of endwalls is proposed at the outlet of storm water conveyance structures, these structures will be built of 3000 psi concrete, except in special cases 3,500 psi may be required by the Township Engineer. Special care shall be used by the Design Engineer to select the proper endwall to fit the conditions.

   The Design Engineer shall provide appropriately proportioned energy dissipators and level spreaders at all outlet structure within a collection system discharging to vegetated swales or drainageways.

8. All storm sewer pipe within street cartways or other paved areas shall be backfilled with 2 RC stone places in six-inch lifts and compacted to the satisfaction of the Township Engineer or his duly appointed representative.

9. Where storm sewers and culvert pipes discharge into existing drainage channels at an angle greater than 30° from parallel with the downstream channel flow, the far side bank shall be stabilized by the use of riprap or masonry, and/or concrete walls, the stabilization shall be designed to prevent erosion and frost heave under and behind the stabilizing media.

B. Inlet Capacity and Type

1. The interval between inlets collecting storm water runoff shall be determined in accordance with DM-2, Section 10.5 “Capacity of Waterway Areas.” In curbed sections, the maximum encroachment of water on the roadway pavement shall not exceed half of a through traffic lane or one inch less than the depth of curb during the required frequency storm of five minutes duration. Inlets shall be provided to control the encroachment of water on the pavement.

2. Inlets shall be standard precast types as indicated in Pennsylvania Department of Transportation Design Standards Publication 72 – Plate RC-34. The design capacity of all four-foot standard inlets shall be 2 CFS, and for all six-foot special inlets shall be 5 CFS.

3. On curbed roadways, all street inlet tops shall be the combination curb and gutter inlet referred to as Pennsylvania Department of Transportation Type “C”, with a ten-inch curb reveal to allow an automatic depressed condition to exist when used with an eight inch curb. All inlet tops shall be precast concrete with heavy duty steel grating. Weep holes shall be provided on all inlet tops. In private parking areas, streets, yard areas and drainage swales with no curbing, Type “M” inlet tops shall be used.

4. In traffic lanes where grates are used, the grates must be bicycle safe.

Section IV. Runoff Control Measures

A. Design of Detention Basins

All detention basins shall be designed as per the procedures developed by the U.S. Department of Agriculture, Soil Conservation Service, as outlined in their Technical Release No. 55, urban Hydrology for Small Watersheds, or by use of a method of plotting flood stages based on the Rational Method, where drainage areas are less than 10 acres.

1. Unless permitted as a special exception by the Zoning Hearing Board, detention basins shall not be located within flood plains; nor within areas of flood plain soils with the exception that areas of alluvial soils may be utilized if proof is accepted that the area is not subject to flooding.

2. Detention basins shall be designed to facilitate regular maintenance, mowing, and periodic desilting and reseeding.

3. Whenever possible, the side slopes and basin shape shall conform to the natural topography. When such design is impracticable, the construction of the basin shall utilize slopes as flat as possible to blend the structure into the terrain.

4. In residential developments, shallow broad basins may be provided for recreational use.

5. Lakes and Ponds.

a. Existing or proposed lakes and ponds may be used for storm water detention provided the design criteria herein are met, and are in accordance with DEP, Chapter 105 Permit Requirements.

b. All related basin structural components shall be constructed of reinforced concrete.

c. The minimum level and the size of the permanent pool shall be adequate to deter the growth of undesirable vegetation and mosquitoes.

B. Basin Design Criteria

1. Riser – A precast inlet riser may be provided at the outlet of detention basins. The riser shall be constructed of metal or concrete as approved by the Township engineer. A one foot minimum freeboard shall be provided between the top of the riser and the crest elevation of the emergency spillway. The riser shall be designed so that the rate of outflow is controlled by the pipe barrel through the basin berm when the depth of the water within the basin exceeds the height of the riser or by accurately sized orifices. A trash rack or similar appurtenance shall be provided to prevent children and debris from entering the riser where openings greater than 12 inches in diameter are used. The base shall be sufficient weight to prevent flotation of the riser.

2. Maximum Depth of Detention Basins – In general, the maximum depth of water in a detention basin measured to the invert of the emergency spillway shall not exceed five feet.

3. Emergency Spillway – Whenever possible, the emergency spillway for detention basins shall be constructed on undisturbed ground. All emergency spillways shall be constructed so that the detention basin berm is protected against erosion. Emergency spillways shall extend along the upstream and downstream berm embankment slopes. The upstream edge of the emergency spillway shall be a minimum of three feet below the spillway crest elevation. The downstream slope of the spillway shall at a minimum extend to the toe of the berm embankment. The emergency spillway shall not discharge over uncompacted earthen fill and/or easily erodible material. The Township Engineer may require the use of stone riprap, or concrete spillways when slopes would exceed one to four and spillway velocities might exceed Soil Conservation Service standards for the particular soils involved.

4. Antiseep Collars – Antiseep collars shall be installed around the principal pipe barrel within the normal saturation zone of the detention basin berms. The antiseep collars and their connections to the pipe barrel shall be watertight. The antiseep collars shall extend a minimum m of two feet beyond the outside of the principal pipe barrel. The maximum spacing between collars shall be 14 times the minimum projection of the collar measured perpendicular to the pipe.

5. Freeboard – Freeboard is the difference between the design flow elevations in the emergency spillway and the top of the settled detention basin embankment. The minimum freeboard shall be two feet.

6. Slope of Detention Basin Embankment – The top or toe of any slope shall be located a minimum of 10 feet from any property line. Whenever possible the side slopes and basin shape shall be amenable to the natural topography. Straight side slopes and rectangular basins shall be avoided whenever possible.

    a. Exterior slopes of compacted soil shall not exceed one foot vertical for three feet horizontal, and may be further reduced if the soil has unstable characteristics.

    b. Interior slopes of the basin shall not exceed one foot vertical in three feet horizontal except with approval of the Township.

7. Width of Berm – The minimum top width of detention basin berms shall be 10 feet.

8. Slope of Basin Bottom – In order to insure proper drainage of the detention basin, a minimum grade of 2% shall be maintained for all sheet flow.

    a. Inlet and outlet structures will be located at maximum distances from one another. The Township Engineer may require a rock filter berm or rock-filled gabions between inlet and outlet areas when the distance is deemed insufficient for sediment trapping. All shall discharge to areas of the basin which slope downward to lower elevations of the basin.

    b. A collecting swale and/or underdrain shall be provided to drain basins intended for recreational use where the slope of the basin bottom may be reduced to 1%.

9. Energy Dissipators – Energy dissipating devices (riprap, end sills, etc.) shall be placed at all basin outlets. Level spreaders shall be provided to spread discharges across drainage swales to prevent concentrated and erosive flows.

10. The distance from the highest free water surface of any detention basin or drainage facility to a dwelling unit shall be a minimum of 100 feet.

11. Fence or Screening.

    a. The Board of Supervisors may require fencing of a storm water detention basin where depths of water in excess of three feet for a period of longer than two hours are proposed.

    b. All fencing should be at least 3 1/2 feet in height as approved by the Township.

    c. A vegetative screening of suitable landscaping plant material in or around a detention basin may also be required. Vegetative screenings should generally provide a barrier to prevent entrance to, and effectively naturalize the appearance of, the detention basin area.

12. Landscaping and Grading of Detention Basins – All landscaping and grading standards particularly applicable to detention basins are include in Article VII, § 320-49.

13. A soils Investigation Report shall be prepared for storm water detention basins and other structures as required by the Township Engineer. The report shall identify unsuitable conditions, recommend remedial actions, and determine potential risks to proposed improvements.

    a. A minimum of three soil borings shall be required at the location of each storm water detention basin. Soil borings shall be required at the emergency spillway, the pool or borrow area, and the centerline of the dam at the barrel. In any case, the Township reserves the right to require additional soil borings.

    b. The minimum soil boring depth shall be to the seasonal high water table or five feet below the bottom of the storm water management facility, whichever is greater, or to refusal.

    c. Soil boring data required:

        (1) Bearing strength (number of blows) required for ponds only.

        (2) Unified soil classification for each stratum.

        (3) Depth to refusal

        (4) Depth to the seasonal high water table.

        (5) U.S.D.A soil textural classification for each stratum.

14. A quality control program is critical for embankment fills. Therefore:

    a. Wherever embankment fill material in excess of three feet is to be used, each layer of compacted fill shall be tested to determine its density per ASTM D 1556. The density of each layer shall not be less than 95% of maximum dry density as determined by ASTM D 1557.

    b. Inspection shall be conducted in accordance with the general procedure outlined in Article X, § 320-84.

    c. Compaction test reports shall be kept on file at the site and be subject to review at all times by the Township Engineer.

    d. When rock is encountered during the excavation of a pond, it shall be removed to an elevation of at least 12 inches below the proposed basin floor.

    e. Temporary and permanent grasses or stabilization measure shall be established on the sides and base of all earthen basins within 15 days of construction.

15. Design Information – As part of the Stormwater Management/Erosion and Sediment Pollution Control Plan, all design information shall be submitted including, but not limited to, the following:

a. General description or proposed facilities and the operation of the runoff control measures.

b. All computations of the storm water runoff before, during, and after construction, including all supporting material.

c. A sketch of the berm embankment and outlet structure indicating the embankment top elevation, embankment side slopes, top width of embankment, emergency spillway elevation, perforated riser dimensions, pipe barrel dimensions, and dimensions and spacing of antiseep collars.

d. Design computations for the pipe barrel and riser.

e. A plot of the stage-storage and stage discharge (acre-feet vs. elevation) and all supporting computations.

f. Flood routing computations, where required by the Township Engineer.

g. A detailed plan of the trash rack and anti-vortex device.

h. A plan, at a scale of one inch equals 50 feet, showing the grading, landscaping and fencing around the detention basin.

i. Soils Investigation Report, where required.

Section V. Design Criteria for Facilities to Encourage Recharge

A. Design of Seepage Pits and Seepage Trenches for Infiltration of Roof Drainage

These structures shall be designed to assimilate, in 72 hours, a volume of water equal to 0.2 cubic feet per square foot of roof coverage (i.e., length x width of building space covered), and to assimilate in two hours a volume equal to 0.1 cubic feet per square foot of roof coverage. Figure A provides an example.

1. Runoff control capacity may be distributed among several seepage pits, trenches, or runoff control berms so long as total assimilative capacity of all structures equals the required volume.

2. Seepage pits connected to roof drains should be located at least 10 feet from basement walls and downhill from the building in the direction of groundwater flow.

3. The bottom of a seepage pit should be at least two feet above seasonal high water table and bedrock or be shown to be otherwise capable of handling required design volumes.

4. The soils on which a seepage pit or trench are located shall have a minimum infiltration rate of 0.27 inches per hour based upon soils data obtained by direct testing methods in accordance with § 320-35.

5. The porosity of the gravel or rock to be used in seepage pits must be specified in the plan. The rock or gravel shall be covered with a ground stabilization fabric (trade names: Mirafi 500 (Monsanto), Typer (Dupont), Bidim, Supac or equivalent.

6. Where adequate seepage pit capacity is difficult to achieve with a rock-filled pit, a concrete (or equivalent material) culvert pipe with a lid may be placed vertically over a stone bed to provide storage capacity; alternatively, a septic tank-type structure operating as a cistern with discharge to the seepage pit may be used.

7. The longer dimension of seepage pits or seepage trenches should parallel the slope where slopes exceed 5%.

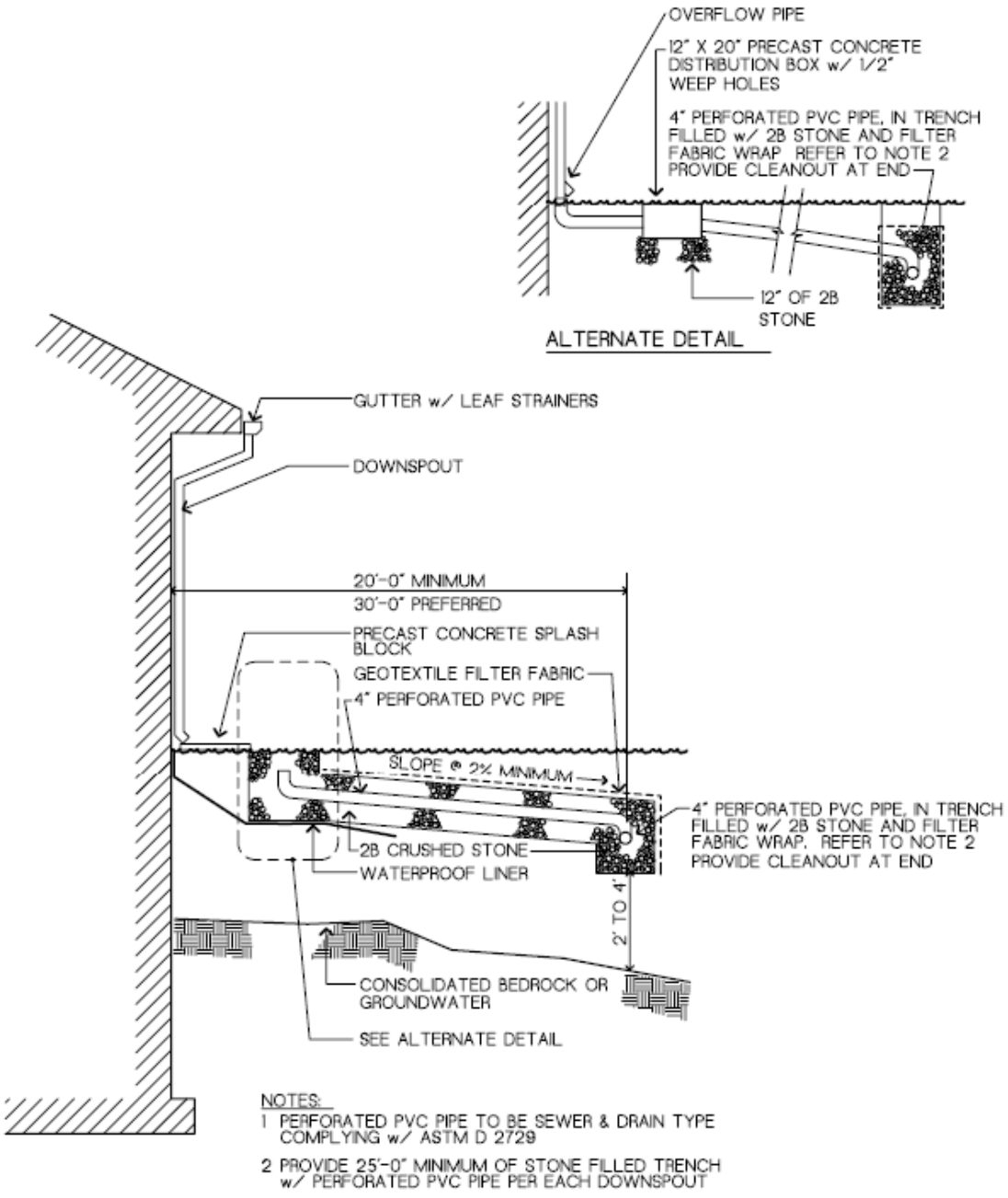


Figure A Roof Runoff Infiltration Trench

NO SCALE

8. Seepage pits or seepage trenches shall not be installed on slopes greater than 20%, and shall be kept away from man-made grades.

9. The use of a perforated or porous pipe leading to the seepage pit is encouraged.

10. In all cases, an overflow system should be provided to accommodate heavy rains in excess of the design criteria.

11. Seepage pits or the drains to them must contain a sediment trap which can be maintained regularly. All downspouts should have leaf strains to prevent leaves from clogging the seepage pit.

12. Design of Seepage Pits and Seepage Trenches – other than Roof Drainage

    Where seepage pits or trenches will be used for infiltration of flows from grassed areas or street, runoff, their design shall generally follow the guidelines of Section 1 (2-8) above. It is also suggested that:

    a. Seepage trenches for such flows be located in diversion channels where feasible.

    b. Seepage pits be installed in drainage swales uphill of check dams or small detention facilities.

13. Design of Cisterns for Water Storage Facilities

    a. These structures shall either be located within a building or below frost level where they will be protected against freezing. They shall be designed to hold 0.2 cubic feet of water per square foot of roof coverage.

    b. Access to the structures by insect or animal vectors shall be controlled by screens or other obstructions.

    c. Facilities should have a means of access for cleanout of accumulated debris or sediment.

    d. Facilities to be used for non-potable water supply purposes shall comply with plumbing code regulations for cross-connections.

    e. Septic tank-type structures are recommended for smaller facilities.

    f. Roof top storage must comply with all building code regulations on load limitations and other related factors.

    g. All water storage facilities shall be equipped to divert flows in excess of their holding capacity to appropriate areas of discharge. If water stored in cisterns will not be used for non-potable water supply purposes, the facility shall be designed to drain down through a seepage bed within 72 hours.

320 Attachment 6

Rye Township

Appendix F

Guidelines for Minimizing Erosion and Sediment

A. General Guidelines

To minimize erosion and sedimentation and the pollution of air and water in areas that are being developed for residential, industrial, commercial and institutional uses, it is essential that the following guidelines be adhered to:

1. Choose a site that has good natural drainage, topography, and soil.

    a. Avoid low areas subject to ponding or flooding.

    b. Avoid areas with slopes steeper than 15%.

    c. Avoid shallow, wet, or extremely stony soils.

    d. Check soils map in local Soil Conservation Service office for limitations of planned uses.

    e. Check soils when on-site sewage disposal or basements are planned.

2. Hold site grading to a minimum.

    a. Avoid excessive grading that would change the natural drainage pattern, cause steep area or result in excessive erosion.

    b. Divert water away from erosive areas with diversion channels.

    c. Expose as small an area of soils for as short a time as possible.

    d. Save all topsoil by stockpiling. Stockpiles should be mulched and/or seeded and redistributed uniformly after grading.

    e. Use culverts when crossing streams with grading equipment.

    f. Use temporary vegetation to protect bare areas from erosion during construction.

    g. Save trees and other existing vegetation as they enhance the beauty of the property and prevent erosion. Mark or rope off trees to protect them from construction equipment.

3. Protect air and water from pollution.

    a. Construct debris basins to catch silt and debris before it enters into the streams or causes damage to other properties.

    b. Keep dust within tolerable limits by sprinkling or by the use of dust suppressing chemicals, such as calcium chloride.

    c. Locate sanitary facilities, equipment repair and maintenance areas so as to prevent pollutants from entering streams, springs, or wells.

4. Establish and maintain conservation measures after construction.

    a. Promptly landscape and seed lawns and other disturbed areas.

    b. Repair damaged areas by reseeding or sodding.

    c. Lime, fertilize, and manage to maintain adequate vegetation.

B. Guidelines for Subdivision Development (Residential, Industrial, Commercial and Institutional)

1. Locate buildings on site to provide adequate drainage. Ideally, there should be surface drainage from all sides of the building without excessive cutting or filling. Provide adequate storm drainage outlets to the street, storm sewers, or to other areas where disposal does not create landslide, erosion or flooding problems.

2. Plan streets, roads, parking lots and driveways to avoid excessive grades. Fit the streets, roads, lost and driveways to the contour of the land. Steeply sloping driveways, unless surfaced, are subject to severe gullying. Whenever possible, keep driveway grades less than 8%.

3. Hold site grading to a minimum. Excessive grading can change the natural drainage pattern, create landslides, cause groundwater to seep into the surface and result in soil erosion. Save all topsoil by stockpiling. Stockpiles should be mulched and/or seeded and redistributed uniformly after grading.

4. Save trees and other existing vegetation. Good vegetative cover provides the best protection against soil erosion. Trees and other vegetation also enhance the beauty of the property and provide shade. Mark the trees you want to save with a bright colored tape. Protect them against damage from construction equipment by roping them off. Avoid filling around trees; or where filling is necessary, construct dry wells around the tree.

5. Expose as small an area of land for as short a period as possible. It is poor practice to remove all topsoil and vegetation from large areas. Siltation and sediment from these areas may cause damage and be expensive to clean up. When areas must be exposed or bared, keep the exposure time to a minimum.

6. Plant temporary vegetation during development in critical areas, including topsoil stockpiles. Sometimes, large areas or steep areas must be bared during construction. Protect these areas with temporary seedings of rye, annual rye grass, cereal grain, and/or mulching to keep erosion and sediment to a minimum. Temporary seeding or mulching should be done as soon as rough grading is completed.

7. Install conservation measures to protect the site. In many situations where the land is exposed during construction, vegetation alone cannot adequately protect the land. In other cases, excessive storm runoff must be diverted to safe disposal areas. Conservation practices, such as diversions, waterways, debris basins, or grade stabilization structures, will do the job effectively and economically.

8. Plant permanent vegetation as soon as practical after construction. Prompt establishment of lawns and other landscape plantings will provide permanent protection from erosion and will also beautify the site and enhance the value of the development.

9. Repair and maintain conservation practices and vegetation. Repair damaged areas by reseeding or sodding. Lime and fertilize as needed to maintain adequate vegetation. Mow to discourage weeds.

C. Guidelines for Highway or Road Construction

1. Use drainage structures to divert or carry runoff water.

   a. Install diversions at the top of cut slopes where the land beyond the right-of-way slopes toward the road.

      (1) Construct these diversions with spoil or topsoil material as opposed to deep-ditch construction so there is a minimum disturbance of the soil surface and natural vegetation, or

      (2) Where space is limited, use concrete, metal, asphalt, stone or other permanent durable lined channels.

   b. Use diversions on all slope lengths greater than 150 feet, including slopes at interchanges or cloverleafs.

   c. Design diversions and drainageways to handle estimated water flow as determined by the rational methods or parametric methods of computing runoff.

      (1) Use vegetation protected with jute matting in drainageways where the velocity is between three to seven feet/sec.

      (2) Use mechanical linings such as: metal, concrete, asphalt, etc. in drainageways where the velocity is greater than seven feet/sec.

   d. Control seepage in cut slopes with underdrains or vertical drains.

e. Discharge flow from channels, diversions and closed conduits into outlets or channels capable of handling the flow at non-erosive velocities. Use energy dissipators on conduits with outlets on steep slopes or where channels will erode.

f. Use temporary bridge or culvert structures for crossing all live streams or watercourses.

g. Consider benches at about 40 feet vertical intervals to provide access to slope for seeding and maintenance.

h. Use underdrains to prevent frost damage to roads laid on soils with seasonal high water tables.

i. Use materials for road base to drain water and prevent frost damage. Consult standard specifications of American Society for Testing and Materials, City of Pittsburgh, Pennsylvania Department of Transportation and American Public Works Association.

2. Use vegetation to stabilize bare areas subject to erosion and sediment.

a. Use current Pennsylvania Department of Transportation, Soil Conservation Service, or Penn State University guidelines for selection of seed mixture(s) and application rates for the various slope and soil conditions.

b. Avoid smooth, fine, loose seedbeds. Leave seedbeds in a slightly rough but firm condition (similar to that left by cleat marks of a bulldozer run up and down the slope.)

c. Control construction sequences to minimize the size of exposed area and the length of exposure time by:

(1) Bringing all cut and fill slopes to final grade as soon as possible in the construction sequence and seed and mulch immediately.

(2) Using temporary seedings and/or mulch on all areas where, because of season or delay of final grading, the permanent seeding and mulching cannot be completed.

(3) Using temporary seedings and/or mulch on all stockpiles of topsoil, spoil, and in all borrow areas.

d. Apply mulch.

e. Tie down mulches used with permanent seedings by:

(1) Applying not less than 150 to 200 gallons of asphalt emulsion per acre.

(2) Using a soil compactor with notched disk or a disk set straight to “cut in” the straw or hay mulch.

f. Use plantings and seedlings for fast development of root systems and ground cover.

D. Guidelines for Recreational Developments

1. Select sites with favorable soils and slope conditions. Soil maps and soil suitability ratings for various recreational facilities are available in the Soil Conservation Service office. Slopes over 8% are generally not suitable for recreational development except for specialized uses such as ski-slopes, trails, picnic areas and golf courses.

2. Locate facilities so there is adequate drainage away from them.

3. Install sediment traps or debris basins prior to site grading. Clean cut as necessary.

4. Establish temporary vegetation and/or mulch on critical slopes which will be bare for two or more months.

5. Install permanent conservation measures.

E. Guidelines for Utility Construction

Utilities, transmission systems, sewer, water and gas lines are generally installed without particular concern for existing slopes. The scar produced during the clearing operations is quite susceptible to water erosion. The following guidelines should be considered during the construction and maintenance stages of these right-of-ways:

1. Install diversions at the top of slopes where the land slopes toward the utility line.

2. Use temporary structures for crossing all live streams or watercourses. Where an access road must he maintained through the right-of-way for maintenance purposes, the structures must be designed for permanent use.

3. Construct temporary diversions along the contours to prevent excessive erosion.

4. Apply vegetation of the types and kinds that will require minimum maintenance.

F. Guidelines for Cuts and Fills

These principles apply to land manipulation and transposition. The cut and fill process for the development of a single-family dwelling site, a shopping center or industrial park are the same. The complexity varies and plans and design should be developed to meet the individual site requirements.

1. Prior to construction inventory, analyze and evaluate soils to be moved and soils in area to be filled.

a. Land to be cut or filled should be cleared of trees, stumps, roots, brush, boulders, sod and debris.

b. Fill areas should be scarified, keyed and drained.

c. Fill material should be free of sod, roots, frozen soil, or other decomposable material.

d. The placing and spreading of fill material should be started at the lowest point and brought up in horizontal layers of such thickness (usually six inches to eight inches) that the designed compaction may be attained.

e. Generally a 3:1 slope should be used unless specific engineering data shows a steeper slope is stable. Slopes of 3:1 or flatter are desirable for erosion control and maintenance.

f. Fills in excess of 40 feet may need to be benched with a water diverting type bench to provide access for seeding and mulching equipment and for maintenance.

g. Fills should be seeded and/or mulched immediately upon completion of earth placement.

h. Water management systems should be provided to prevent water concentrating and eroding the face of slope and to keep surface water off the face of the slope.

CUTS

i. Diversions should be constructed at top of slopes prior to cutting operations to convey water from face of slope.

j. Steepness of cuts will depend on soil type and design/however, cut slopes of 3:1 or flatter are desirable for erosion control and stability.

k. Cut slopes should be benched to provide access for seeding and mulching equipment.

l. Cut slopes should be seeded and/or mulched immediately after topsoil placement. Details on lime, fertilizer, seeding and mulching are found in § 320-49 of the chapter.