

## **ORDINANCE #2005-004**

An Ordinance of the Borough of Langhorne Manor, Bucks County, Pennsylvania amending the Langhorne Manor Borough Subdivision and Land Development Ordinance of 1976 as amended to conform to the provisions of the Subdivision and Land Development Ordinance of the Borough with the provisions of Langhorne Manor Borough, Delaware River South Watershed Act 167, Stormwater Management Ordinance adopted March 1, 2005 and Langhorne Manor Borough, Neshaminy Creek Watershed Stormwater Management Ordinance dated March 1, 2005

WHEREAS, the Pennsylvania Municipalities Planning Code, as amended, confers upon the Council of the Borough authority to amend, change and modify its Subdivision and Land Development Ordinance of 1976 as amended; and

WHEREAS, Council of the Borough of Langhorne Manor, after Public Hearing, has determined that amending the Subdivision and Land Development Ordinance of the Borough as hereinafter set forth, is in the best interest of the Borough and its residents.

**NOW, THEREFORE, BE IT ORDAINED AND ENACTED** that the Langhorne Manor Borough Subdivision and Land Development Ordinance of 1976 as amended, is further amended as hereinafter provided:

Section 1. Section 611 of the Langhorne Manor Borough Subdivision and Land Development Ordinance of 1976 as amended, is deleted in its entirety and there is substituted in its place the following:

### Section 611 Stormwater Management and Surface Runoff Control

- (a) General. The developer shall construct and/or install such drainage structures, on- and off-site, as necessary to:
- (1) Prevent erosion damage and to satisfactorily carry off or detain and control the rate of release of surface waters.
  - (2) Encourage all runoff control measures to percolate the stormwater into the ground to aid in the recharge of ground waters.
  - (3) Carry surface water to the nearest adequate street, storm drain, detention basin, natural watercourse, or drainage facility.
  - (4) Take surface water from the bottom of vertical grades, to lead water away from springs, and to avoid excessive use of cross gutters at street intersections and elsewhere.
  - (5) Handle the anticipated peak discharge from the property being subdivided or developed and the existing runoff being contributed from all land at a higher elevation in the same watershed.

- (6) Maintain the adequacy of the natural stream channels. Accelerated bank erosion shall be prevented by controlling the rate and velocity of runoff discharge to these watercourses, so as to avoid increasing the occurrence of stream bank overflow.
  - (7) Preserve the adequacy of existing culverts. Bridges and similar structures shall be preserved by suppressing the new flood peaks created by new land development.
- (b) Retention of Existing Watercourses and Natural Drainage Features.
  - (1) Whenever a watercourse, stream, or intermittent stream is located within a development site, it shall remain open in its natural state and location and shall not be piped.
  - (2) The existing points of natural drainage discharge onto adjacent property shall not be altered without the written approval of the affected landowners.
  - (3) No stormwater runoff or natural drainage shall be so diverted as to overload existing drainage systems, or create flooding or the need for additional drainage structures on other private properties or public lands.
- (c) Design Criteria - Stormwater Management
  - (1) The provisions of the Langhorne Manor Borough Delaware River South Watershed Act 167 Stormwater Management Ordinance, a true and correct copy of which is available from Langhorne Manor Borough, is incorporated into the Langhorne Manor Borough Subdivision and Land Development Ordinance by reference. Where the provisions of this Ordinance (the Langhorne Manor Borough Subdivision and Land Development Ordinance) conflict with provisions of the Langhorne Manor Borough Delaware River South Watershed Act 167 Stormwater Management Ordinance, the strictest provisions, as determined by the Borough, shall apply.
    - (i) No regulated activities, as outlined in Section 104 of the Langhorne Manor Borough Delaware River South Watershed Act 167 Stormwater Management Ordinance, shall be approved unless approval has been obtained for a stormwater management plan which complies with the provisions of this Ordinance and the Langhorne Manor Borough Delaware River South Watershed Act 167 Stormwater Management Ordinance.
    - (ii) This Section and the provisions of the Langhorne Manor Borough Delaware River South Watershed Act 167 Stormwater Management Ordinance shall apply to all areas of the Borough within the Delaware River South watershed.
  - (2) The provisions of the Langhorne Manor Borough Neshaminy Creek Watershed Stormwater Management Ordinance, a true and correct copy of which is available from Langhorne Manor Borough, is incorporated into the Langhorne Manor Borough Subdivision and Land Development Ordinance by reference. Where the provisions of this Ordinance (the Langhorne Manor Borough Subdivision and Land Development Ordinance) conflict with provisions of the Langhorne Manor Borough Neshaminy Creek Watershed Stormwater Management Ordinance, the strictest provisions, as determined by the Borough, shall apply.

- (i) No regulated activities, as outlined in Section 105 of the Langhorne Manor Borough Neshaminy Creek Watershed Stormwater Management Ordinance, shall be approved unless approval has been obtained for a stormwater management plan which complies with the provisions of this Ordinance and the Langhorne Manor Borough Neshaminy Creek Watershed Stormwater Management Ordinance.
  - (ii) This Section and the provisions of the Langhorne Manor Borough Neshaminy Creek Watershed Stormwater Management Ordinance shall apply to all areas of the Borough within the Neshaminy Creek watershed.
- (d) Design Criteria - Detention and Retention Basins.
- (1) A flow system with capacity for the 100-year storm shall be provided to carry runoff to a detention basin. When the capacity of the storm drainpipe is exceeded, an overflow system shall have sufficient capacity to carry the runoff difference between the 100-year storm peak flow rate and the capacity of the storm drainpipe system. The 100-year storm peak shall be calculated by the Soil Cover Complex Method.
  - (2) Unless permitted as a special exception by the Zoning Hearing Board, detention basins shall not be located neither within floodplains; nor within areas of floodplain soils with the exception that areas of alluvial soils may be utilized if proof is accepted that the area is not subject to flooding.
  - (3) Detention basins shall be designed to facilitate regular maintenance, mowing and periodic de-silting and re-seeding.
  - (4) 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.
  - (5) In residential developments, shallow broad basins shall be provided for recreational use.
  - (6) The maximum slope of the earthen detention basin embankments shall be 3 horizontal to 1 vertical.
  - (7) The top or toe of any slope shall be located a minimum of 5 feet from any property line.
  - (8) The minimum top width of the detention basin berm shall be 10 feet.
  - (9) In order to insure proper drainage on the basin bottom, a minimum grade of 2% shall be maintained for areas of sheet flow. For channel flow, a minimum grade of 1% shall be maintained.
  - (10) A collecting swale shall be provided to drain basins for recreational use.
  - (11) If permanent ponds are used, the developer shall demonstrate that such ponds are designed to protect the public health and safety.
  - (12) Emergency Spillways.
    - (i) Emergency overflow facilities shall be provided for detention facilities to handle runoff in excess of design flows.
    - (ii) Whenever possible, the emergency spillway for detention basins shall be constructed on undisturbed ground.
    - (iii) Emergency spillways shall be constructed of grass pavers or other material approved by the Borough Engineer.
    - (iv) All emergency spillways shall be constructed so that the detention basin berm is protected against erosion.

- (v) The minimum capacity of all emergency spillways shall be the peak flow rate from the 100-year design storm after development.
  - (vi) The construction material of the emergency spillway shall extend along the upstream and downstream berm embankment slopes.
  - (vii) The upstream edge of the emergency spillway shall be a minimum of 3 feet below the spillway crest elevation.
  - (viii) The downstream slope of the spillway shall, as a minimum, extend to the toe of the berm embankment.
  - (ix) The emergency spillway shall not discharge over earthen fill and/or easily eroded material.
  - (x) The minimum freeboard shall be 1 foot. Freeboard is the difference between the design flow elevations in the emergency spillway and the top of the settled detention basin embankment.
- (13) Anti-seep Collars.
- (i) Anti-seep collars shall be installed around the pipe barrel within the normal saturation zone of the detention basin berms.
  - (ii) The anti-seep collars and their connections to the pipe barrel shall be watertight.
  - (iii) The anti-seep collars shall extend a minimum of 2 feet beyond the outside of the principal pipe barrel.
  - (iv) The maximum spacing between collars shall be 14 times the minimum projection of the collar measured perpendicular to the pipe.
  - (v) A minimum of two anti-seep collars shall be installed on each outlet pipe.
- (14) Outlet Pipes.
- (i) All outlet pipes through the basin berm shall be reinforced concrete pipe with watertight joints.
  - (ii) Energy dissipating devices (rip-rap, end sills, etc.) shall be placed at all basin outlets.
- (15) Perforated Risers.
- (i) A perforated riser shall be provided at each outlet of all detention basins during construction for sediment control.
  - (ii) The riser shall extend to a maximum elevation of 2 feet below the crest elevation of the emergency spillway.
  - (iii) The perforated riser shall be designed so that the rate of outflow is controlled by the pipe barrel through the basin berm when the depth of water within the basin exceeds the height of the riser.
  - (iv) Circular perforations with a maximum diameter of 1 inch shall be spaced 8 inches vertically and 12 inches horizontally.
  - (v) The perforations shall be cleanly cut and shall not be susceptible to enlargement.
  - (vi) All metal risers shall be suitably coated to prevent corrosion and wrapped with geotextile fabric to filter sediment.
  - (vii) A trash rack or similar appurtenance shall be provided to prevent debris from entering the riser.
  - (viii) All risers shall have a concrete base attached with a watertight connection.

- (ix) The base shall be of sufficient weight to prevent flotation of the riser.
  - (x) An anti-vortex device, consisting of a thin vertical plate normal to the basin berm, shall be provided on the top of the riser.
- (e) Design Criteria - Drainage Channels and Swales.
- (1) All drainage channels shall be designed to prevent erosion of the bed and banks.
  - (2) The maximum permissible flow velocity shall not exceed those outlined in Table 1.
  - (3) Suitable stabilization shall be provided where required to prevent erosion of the drainage channels.
  - (4) Any vegetated drainage channel requiring mowing of the vegetation shall have a maximum grade of 4 horizontal to 1 vertical on those areas to be mowed.

<b>TABLE 1</b> <b>ALLOWABLE WATER VELOCITIES</b>				
<b>Permissible velocities for channels lined with vegetation(a).</b> <b>The values apply to average, uniform stands of each type of cover.</b>				
		<b>Permissible Velocity (feet per second)</b>		
<b>Cover</b>	<b>Slope Range(b) (Percent)</b>	<b>Erosion Resistant Soils</b>	<b>Easily Eroded Soils</b>	
Bermuda grass	0-5	8	6	6
	5-10	7	5	5
	over 10	6	4	4
Buffalo grass, Kentucky bluegrass, Smooth brome, or Blue grama	0-5	7	5	
	5-10	6	4	
	over 10	5	3	
Grass mixture(b)	0-5	5	4	
	5-10	4	3	
Lespedeza sirecea(c), Weeping love-grass(c), Yellow bluestem(c), Kudzu(c), Alfalfa(c), or Crabgrass(c)	0-5	3.5	2.5	
Common lespedeza(d) or Sudan grass(d)	0-5	3.5	2.5	
(a) Use velocities exceeding 5 feet per second only where good covers and proper maintenance can be obtained.				
(b) Do not use on slopes steeper than 10% except for side slopes in a combination channel.				
(c) Do not use on slopes steeper than 5% except for side slopes in a combination channel.				
(d) Annuals: used on mild slopes or as temporary protection until permanent covers are established. Use on slopes steeper than 5% is not recommended.				

(f) Design Criteria - Stormwater Collection and Pipe System.

(1) Storm sewers, culverts, and related installations shall be provided:

- (i) To permit the unimpeded flow of natural watercourses in such a manner as to protect the natural character of said watercourses and to provide regulated discharge.
- (ii) To insure adequate drainage of all low points along the line of streets.

- (iii) To intercept stormwater runoff along streets at intervals reasonably related to the extent and grade of the area drained and to prevent substantial flow of water across intersections.
- (2) The design discharge from drainage areas contributing to the system may be determined by use of the "Rational Equation" ( $Q = CIA$ ) when the total drainage area does not exceed 100 acres.
  - (i) The following runoff factors shall be utilized for the rational equation:

Description of Area	Runoff Coefficient (C)
<b>Residential</b>	
2 acre single-family detached lots	0.40
1 acre single-family detached lots	0.46
½ acre single-family detached lots	0.50
¼ acre single-family detached lots	0.56
Two-family and multi-family	0.70
Commercial	0.75
Industrial	0.80
Parks and Cemeteries	0.38
Unimproved	0.35
Where the above table is not applicable, the following factors may be used:	
Roofs and all impervious surfaces	0.90
All other surfaces except forest	0.40
Forest	0.30

- (ii) The coefficients in the above tabulations are applicable for storms of 10-year frequency and less. The coefficients are based on the assumption that the design storm does not occur when the ground is frozen. Less frequent, higher intensity storms will require the use of higher coefficients.
- (iii) For less frequent storms, the coefficients can be used if they are multiplied by the following factors for the return frequency required.

Storm Frequency (years)	Factors
10 and less	1.0
25	1.1
50	1.2

- (iv) The rainfall intensity "I" curves presented in Figure 5 shall be used in determining stormwater runoff.

- (v) Storm Frequency.
  - [a] A 10-year storm frequency shall be used for the design of all stormwater systems.
  - [b] In all cases where storm drainage is picked up by means of a headwall or inlet structure, and hydraulic inlet or outlet conditions control, the pipe shall be designed as a culvert for a 25-year storm.
- (vi) Storm Duration.
  - [a] A 5-minute storm duration shall be used if this duration does not result in a maximum expected discharge that exceeds the capacity of a 30-inch pipe.
  - [b] If a 5-minute storm duration results in a pipe size exceeding 30 inches, the time of concentration approach shall be used in determining storm duration.
  - [c] If a 5-minute storm duration results in a pipe size exceeding 30 inches, within any run of pipe, the time of concentration approach may be used for sizing of pipes from that point on by adjusting the time of concentration.
- (3) Pipes.
  - (i) Pipes shall be sized by use of Manning's Equation with the pipes flowing full. The design shall be based on gravity (non-pressure) flow.
  - (ii) The roughness coefficient (n) shall be in compliance with the Pennsylvania Department of Transportation Design Manual, Part 2, as amended.
  - (iii) The minimum diameter of all storm drainage pipe shall be 18 inches or an equivalent thereto. Where headroom is restricted, equivalent pipe arches may be used in lieu of circular pipe.
  - (iv) Incremental size changes to storm drainage pipes shall be 6 inches in diameter.
  - (v) Abrupt changes in direction or slope of storm drainage pipe shall be avoided. Where such abrupt changes are required, an inlet or manhole shall be placed at the point of change.
  - (vi) The minimum grade of piping shall provide a minimum velocity of 2½ feet per second and shall have a minimum slope of 0.5%.
  - (vii) Storm sewers shall be placed within a street right-of-way, parallel to the cartway, and shall be designed as a combination storm sewer and underdrain. When located outside of a right-of-way, they shall be placed within an easement having a width of not less than 20 feet, if required by the Borough.
  - (viii) The top of storm drainage pipes beneath cartways shall be at least 6 inches below subgrade elevation. Cast iron pipe may be placed within 3 inches of subgrade elevation. Outside of cartways, all pipes shall have a minimum cover of 2 feet.
- (4) Manholes.
  - (i) Manholes shall neither be more than 300 feet apart on sizes up to 24 inches nor more than 450 feet apart on greater sizes.
  - (ii) Inlets may be substituted for manholes, on approval of the Borough Engineer, at the same spacing as required for manholes.
  - (iii) Manhole covers and frames shall conform to Pennsylvania Department of Transportation Specifications.
- (5) Inlets.
  - (i) At street intersections, inlets shall be placed in the tangent portion rather than the



curved portion of the curbing.

- (ii) When there is a change in pipe size in an inlet, the elevation for the top of the pipes shall be the same or the smaller pipe shall be higher. A minimum drop of 2 inches shall be provided in the inlet between the lowest inlet pipe invert elevation and the outlet pipe invert elevation.
- (iii) If the capacity of the shoulder, swale, curb section, or depressed median section exceeds the assumed inlet capacities, the inlet capacities shall govern the spacing of inlets.
- (iv) If the capacity of the shoulder, swale, curb section, or depressed median section is less than the inlet capacities, then the shoulder, swale, curb section, or depressed section capacity shall govern the spacing of inlets.
- (v) Type C Inlets.
  - [a] Type C inlets shall be installed in unmountable curbs.
  - [b] In order to achieve greater efficiency, Type C inlets shall be spaced so as to permit 5% of the gutter flow to bypass the inlet.
  - [c] The capacity of a Type C inlet at a low point of a street's vertical curve may be designed to accept four (4) cfs from each direction, or a maximum of eight (8) cfs.
  - [d] Inlet capacities shall be based on Figure 6, "Inlet Capacity and Gutter Flow Curves."
- (vi) Type M and S Inlets.
  - [a] Type S inlets shall be installed in shoulder swale areas with back slopes of 6 horizontal to 1 vertical and steeper.
  - [b] Type M inlets shall be installed in swale areas where the back slope is flatter than 6 horizontal to 1 vertical.
  - [c] Inlet capacities shall be based on Table 2, "Type M and S Inlet Capacities (In Swale)."
  - [d] Where a drainage dike is used the side slope of the dike shall be 8 horizontal to 1 vertical or flatter.
  - [e] The capacity of an inlet at a low point in a swale (sump condition) shall be 16 cfs maximum.

<p align="center"><b>TABLE 2</b>  <b>Type M or S Inlet Capacities (In Swale)</b>  <b>Back Slope</b></p>					
Grade	2:1	4:1	6:1	12:1	Dike
1.0	3.2	3.6	3.9	4.1	9.1
2.0	3.5	3.5	3.5	3.7	8.3
3.0	2.5	2.8	3.5	3.5	7.4
4.0	1.6	2.0	3.4	3.2	6.4
5.0	1.6	2.0	3.5	3.0	6.3
6.0	1.6	2.0	3.3	2.8	6.1
7.0	1.5	2.0	3.0	2.6	6.0
8.0	1.5	2.0	2.8	2.4	5.8

(vii) Inlets shall conform to Pennsylvania Department of Transportation specifications.

(viii) Shoulders in Cut Areas (Without Swales).

- [a] Water flowing in the shoulder shall not encroach more than two-thirds the shoulder width during a 10-year frequency storm of 5-minute duration.
- [b] The maximum velocity, as determined by Manning's Equation, shall not exceed the allowable velocities in Table 1 for the specific type of shoulder material.
- [c] Inlets shall be provided to control the shoulder encroachment and water velocity.

(ix) Swales Adjacent to Shoulders.

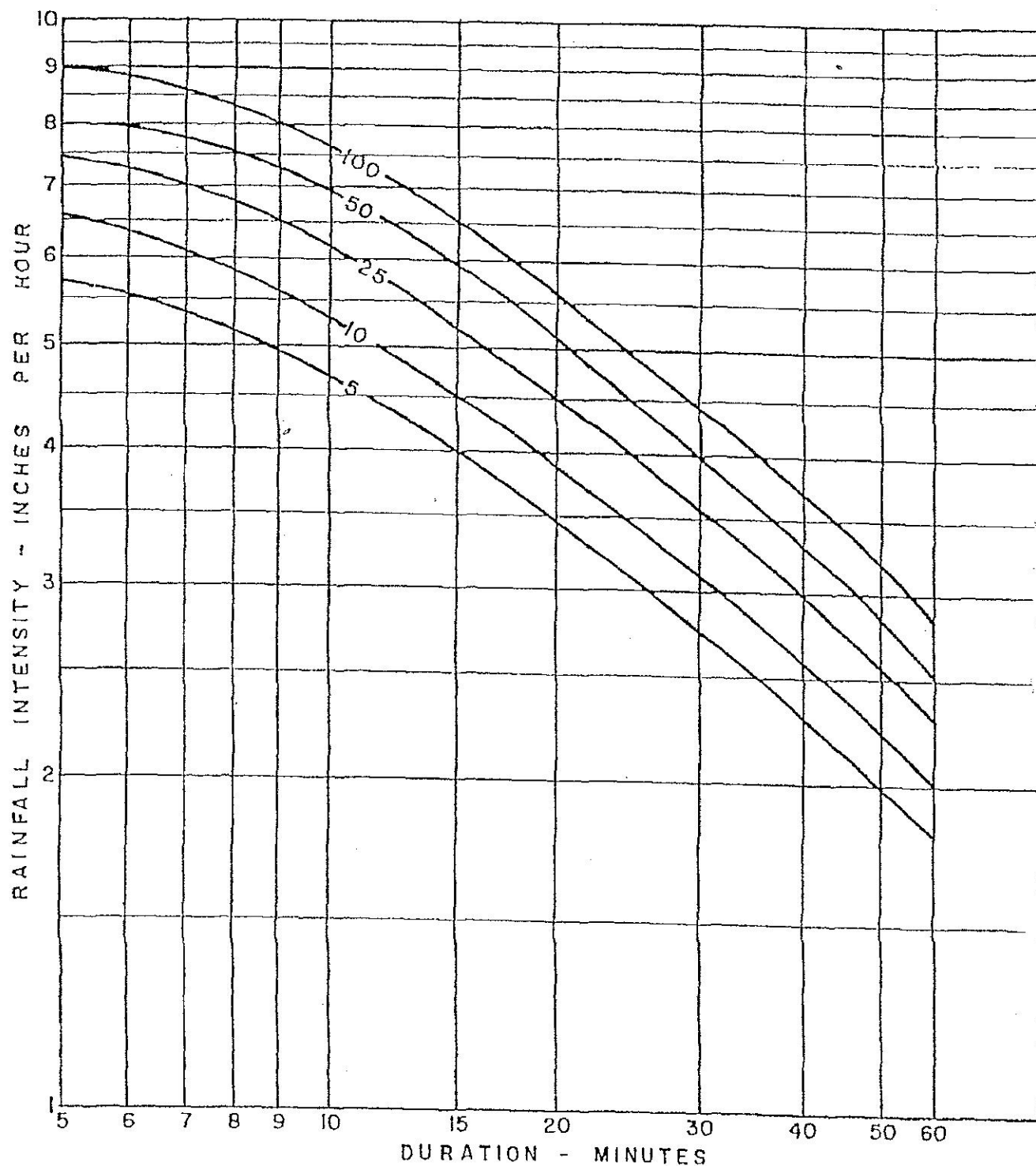
- [a] Swales in cut areas shall be designed to prevent the passage of water onto the cartway during a 10-year frequency storm of 5-minute duration.
- [b] The maximum velocity, as determined by Manning's Equation, shall not exceed the allowable velocities in Table 1 for the specific type of shoulder material.

(x) Curbed Sections.

- [a] The maximum encroachment of water on the cartway shall not exceed 2 inches in depth at the curb during a 10-year frequency storm of 5 minute duration.
- [b] Inlets shall be provided to control the encroachment of water on the cartway.

FIGURE 5

RAINFALL - INTENSITY - DURATION - FREQUENCY CURVES



SOURCE: U.S. Dept of Commerce - Technical Paper No. 25

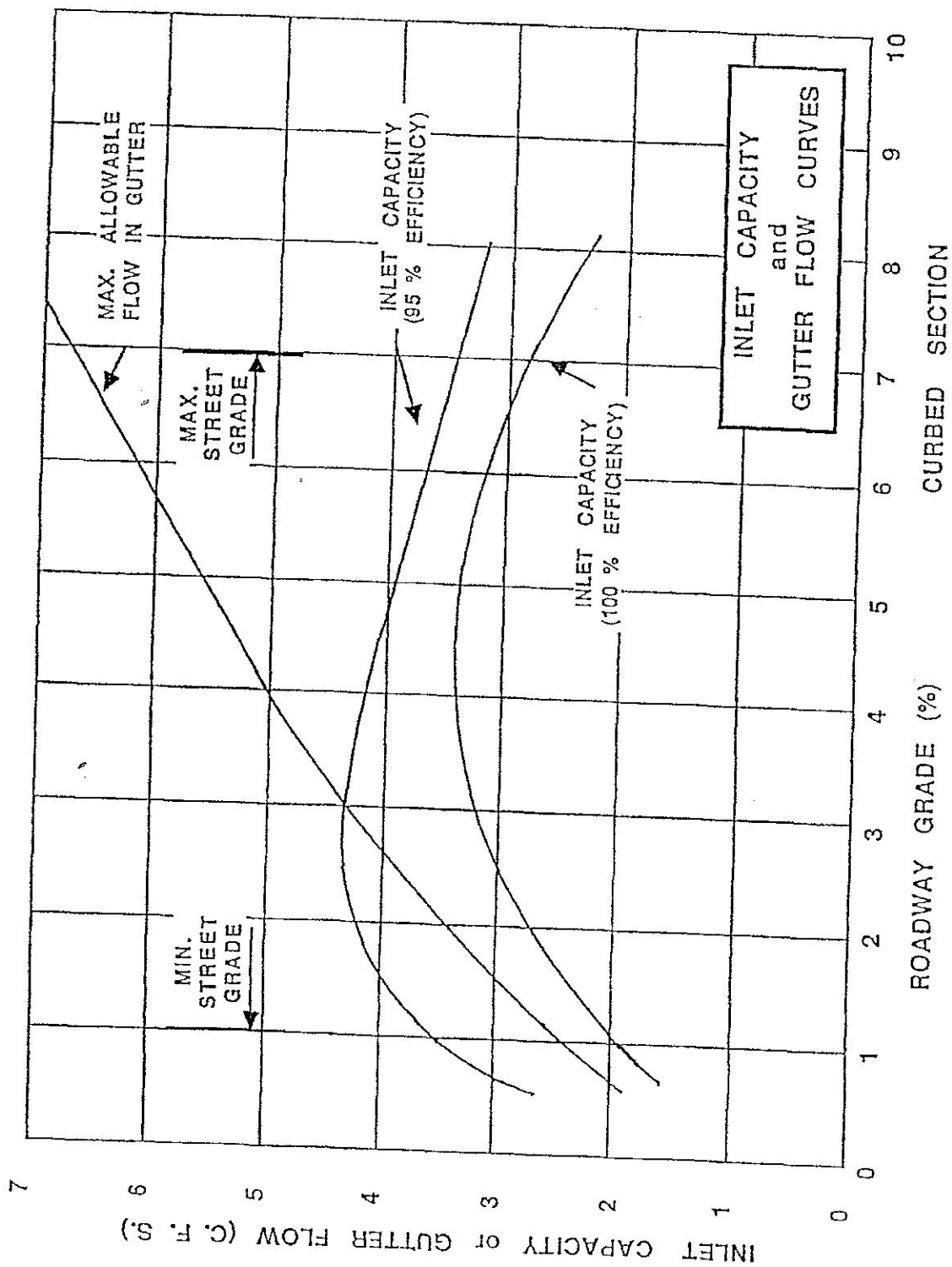


FIGURE 6  
Inlet Capacity and Gutter Flow Curves

Section 2. - Langhorne Manor Borough Subdivision and Land Development Ordinance of 1976 as amended is in all other respects reaffirmed and ratified subject to the Amendment the same as set forth in this Ordinance.

Section 3. - Should any restriction or provision of this Ordinance be declared invalid by any court of competent jurisdiction, such decision shall not affect the validity of this Ordinance as a whole or any part thereof not specifically declared invalid.

Section 4. - This Ordinance shall become effective immediately upon adoption.

DULY ORDAINED AND ENACTED this *2nd* day of *August* 2005.

COUNCIL OF THE BOROUGH OF  
LANGHORNE MANOR

BY: *Maryann Barbee*  
Council President

ATTEST:

*Lucita M. Goff*  
Borough Secretary

APPROVED this *2nd* day of *August*, 2005.

*Dennis J. [Signature]*  
Mayor