

55-323. STORM WATER COLLECTION SYSTEM STANDARDS. [Added
2-20-90 by Ord. No. 1990-4]

- A. The duration of a storm used in computing storm water runoff shall be the equivalent of the time required for water falling at the most remote point of the drainage area to reach the point in the drainage system under consideration.

LU-2107

- B. No pipe size in any storm drainage system shall be less than fifteen (15) inch diameter reinforced concrete pipe or its equivalent.
- C. Dished gutters shall not be permitted on any streets and intersections.
- D. *Storm Drain Pipe Specifications.*
 - (1) Nonperforated storm-drain pipes shall be reinforced concrete pipe in all cases and shall be of the size specified and laid to the exact inches and grades approved by the Board Engineer. Reinforced concrete pipe shall conform to the most current American Society for Testing and Measurement Specifications C76. All pipe shall be Class III, Wall B strength except where stronger pipe is required as determined by the Board Engineer. All pipe shall be designed for American Association of State Highway Officials H20-44 loading and shall meet the minimum cover requirements. In locations other than within the right-of-way of public roads where, because of severe topographic conditions or the desire to minimize the destruction of trees and vegetation, corrugated aluminum pipe, pipe arch, or high-density corrugated polyethylene smooth interior pipe (ADS N-12 or equal) manufactured in accordance with AASHTO M-294 may be used. The material used shall comply with the Standard Specifications for Corrugated Aluminum Alloy Culvert Pipe and Pipe Arch, American Association of State Highway Officials Designation M-196-62 or the Standard Specification for Aluminum Alloy Helical Pipe, American Association of State Highway Officials Designation M-211-65. The minimum thickness of the aluminum pipe to be used shall be in accordance with NJDOT or Ocean County standard specifications, whichever is more stringent.

- (2) Perforated storm drain pipes shall be reinforced concrete pipe or high-density corrugated polyethylene smooth interior pipe (ADS N-12 or equal). If either perforated reinforced concrete pipe or smooth-interior polyethylene pipe is not readily available in the sizes required, then the Township Engineer may permit the use of smooth wall aluminum alloy pipe. All perforated pipe shall be perforated a full three hundred sixty (360°) degrees around the circumference of the pipe and the materials shall conform to the specifications contained in paragraph (1) above.
- E. For all development, blocks and lots shall be graded to secure property drainage away from all buildings and to prevent the collection of storm water in pools and to avoid concentration of storm water from each lot to adjacent lots. Easements or rights-of-way shall be required where storm drains are installed outside streets.
- F. Fill material for lot grading shall have a percolation rate equal to or greater than existing soil conditions. Fill material shall be as free of clay soils as possible. Sieve analyses shall be performed on representative soil samples of all fill material and the effective size and the uniformity coefficient determined. Fill material shall meet or exceed the quality of the existing soil as determined by the sieve analyses.
- G. *Runoff.* All storm drains shall be designed to carry the peak discharge from the entire upstream watershed. The peak discharge shall be determined by the rational method or the Soil Conservation Service tabular method as defined in the United States Department of Agriculture, Soil Conservation Service, Urban Hydrology for Small Watersheds, Technical Release No. 55, latest edition. In the Pinelands peak discharge shall be computed for the fifty (50) year, twenty-four (24) hour storm using Soil Conservation Service TR 55 only.

H. Conduit Sizing. The sizing of conduit for the transmission of storm flow shall be determined by the use of the Manning Formula.

I. Coefficient of Runoff.

(1) The following minimum coefficients shall be used in determining runoff from all off-site contribution areas based upon permitted land use as determined by the current Zoning Ordinance:

- (a) Residential use, lot size one (1) acre or greater: $C=0.30$.
- (b) Residential use, lot size twenty thousand (20,000) square feet or greater but less than one (1) acre: $C=0.40$.
- (c) Residential use, lot size less than twenty thousand (20,000) square feet: $C=0.50$.
- (d) Multifamily use: $C=0.70$.
- (e) Commercial use: $C=0.85$.
- (f) Industrial use: $C=0.80$.
- (g) Parks and other permanent open space: $C=0.2$.

(2) In lieu of more detailed analysis, the above values shall also be used to determine the runoff from the on-site contributing areas. If the designer wishes to present a more detailed analysis, the following coefficients shall be used in determining the average overall coefficient:

- (a) Paved surface (streets, drives, roofs, etc.): $C=0.95$.
- (b) Unpaved bare surfaces: $C=0.6$.
- (c) Grassed areas [flat, less than two percent (2%)]: $C=0.2$.

- (d) Grassed areas [average between two percent (2%) and ten percent (10%)]: $C=0.3$.
- (e) Grassed areas [steep, more than ten percent (10%)]: $C=0.4$.

J. Intensity of Rainfall.

- (1) All subdivision and site plan drainage collection systems shall be designed for a ten (10) year frequency of rainfall, or if the above results in a conduit size at least equivalent to a twenty-seven inch reinforced concrete pipe, then a twenty-five year frequency of rainfall shall be used, or if the above results in a conduit size at least equivalent to a fifty-four (54) inch reinforced concrete pipe, then a fifty (50) year frequency of rainfall shall be used, using the applicable time of concentration.
- (2) Rainfall data shall be taken from the United States Department of Commerce Technical Paper No. 25, Rainfall Intensity/Duration/Frequency Curves, using the Atlantic City weather station data. Stream relocations, bridges, box culverts, pipes over seventy-two (72) inches in diameter and other critical waterways, as determined by the Board Engineer, shall be designed for a one hundred (100) year frequency of rainfall. In all cases, grading should be arranged so that flood damage to buildings and parked motor vehicles can be eliminated.

K. Coefficient of Roughness.

- (1) The following coefficient of roughness shall be used in the Manning Formula to determine pipe capacity:
 - (a) Concrete pipe: $C=0.013$.
 - (b) Concrete pipe box culverts: $C=0.015$.

- (c) Corrugated metal pipe/pipe arch, two and two-thirds by one half ($2 \frac{2}{3} \times \frac{1}{2}$) corr.: C=0.024.
- (d) Corrugated metal pipe, three by one (3 x 1) corr.: C=0.026.
- (e) Corrugated metal pipe/pipe arch (fully paved): C=0.015.
- (f) Corrugated metal pipe arch (paved invert): C=0.019.

(2) The following minimum values shall be used for open channels:

- (a) Concrete lined: C=0.015.
- (b) Earth channels: C=0.025.
- (c) Natural channels: C=0.030.

L. *Velocity Restrictions.* In general, velocities in closed conduits at design flow should be at least two and one-half ($2 \frac{1}{2}$) feet per second but not more than velocity which will cause erosion damage to the conduit. In general, velocities in open channels at design flow shall not be less than five-tenths ($\frac{5}{10}$) foot per second and not greater than that velocity which will begin to cause erosion or scouring of the channel. For unlined earth channels, the maximum velocity allowed will be one and three fourth ($1 \frac{3}{4}$) feet per second. For other channels, sufficient design data and soil tests to the subdivider and shall be made available to the Board at the time of drainage review. At the transition between closed conduits and open channels or different types of open channels, suitable provisions must be made to accommodate the velocity transitions. These provisions may include riprapping, gabions, lining, aprons or chutes and checks all suitably detailed and approved. All inlets shall be equipped with oil/grease and grit separators.

- M. *Drainage Structures.* All drainage structures, including manholes, inlets, headwalls, sections and box culverts, shall conform to the current details of the New Jersey Department of Transportation. Unless approved otherwise by the Board Engineer, all curb inlets shall be standard Type C with curbpiece heights equal to the exposed curb face of the adjacent curb, plus two (2) inches. All lawn inlets shall be standard Type E. When the pipe is such as to require a larger structure, standard Type C1 or C2, E1 and E2 shall be used. If still larger sizes are required, they shall be specifically detailed using standard frames and grates.
- N. *Inlet Capacity.* The maximum collecting capacity of an inlet shall be five (5) cubic feet per second for Type C inlets and five (5) cubic feet per second for Type E inlets, and in addition, gutter flow shall also be limited to provide a maximum gutterflow surface width of eight (8) feet.
- O. *Inlet Location and Spacing.* Inlets shall be located as follows: at all street low points; in all gutters spaced to ensure that the runoff to each inlet does not exceed the collecting capacity as previously established; in yards and swales as required; and as required at intersections to eliminate rocker gutters. In no event shall inlets be placed more than six hundred (600) feet apart.
- P. *Alignment.* Curved alignments shall not be permitted. All pipes shall be constructed on a tangent alignment.
- Q. *End Section.* All discharge pipe shall terminate with an end section of straight cast-in-place concrete or cast-in-place concrete with flared wing walls. Safety gratings shall be installed on all end sections to prohibit entry into pipes.
- R. *Inlets, Catch Basins and Manholes.*
- (1) Inlets, catch basins and manholes shall be designed in accordance with State Highway Department

Standard Plans and Specifications. Frames and grates shall be Campbell Foundry Company Pattern No. 2617 Bicycle Grates with stream-flowing grating or equal.

- (2) Manhole spacing shall be increased with pipe size.

Pipe Size (inches)	Manhole Spacing (feet)
15 or less	500
18 to 36	600
42 to 60	700
60+	700+

- (3) Manholes shall be precast concrete, or brick or concrete block coated with two (2) coats of Portland cement mortar.
- (4) If precast manhole barrels and cones are used, they shall conform to ASTM Specification C-473 with round rubber-gasketed joints, conforming to ASTM Specification C-923. Maximum absorption shall be eight percent (8%) in accordance with ASTM Specification C-478, Method A.
- (5) If precast manholes are utilized, the top rise section shall terminate less than one (1) foot below the finished grade, and the manhole cover shall be flush with the finished grade.
- (6) Manhole frames and covers shall be of cast iron conforming to ASTM Specifications A-48 Class 30 and shall be suitable for H-20 loading capacity. All manhole covers in rights-of-way or in remote areas shall be provided with a locking device. The letters "Year 20__," and the words "STORM SEWER" shall be cast integrally in the cover.
- (7) Inlets, catch basins and manholes shall be trapped, if and where necessary, to provide for oil and grease

separation and siltation and to prevent discharge of same to downstream systems. Locations of proposed traps shall be approved by the Engineer.

- S. *Open Channels.* Generally unlined open channel cross sections shall have side slopes not steeper than four to one (4:1) for channel depths of two (2) feet or less and not steeper than six to one (6:1) for channel depths of more than two (2) feet. Lined open-channel side slopes shall not be steeper than two to one (2:1). The bottom of all unlined open channels and the channel side slopes to at least the design flow level will be sodded with suitable course grass sod. All unlined open-channel side slopes above the design minimum flow level will be topsoiled and seeded or otherwise suitably stabilized in accordance with an approved soil disturbance permit. All unlined open channels which can be expected to have a base flow of five (5) cubic feet per second or more for at least two (2) out of every twelve (12) months will be provided with a low-flow channel, using gabions, riprap, lining, one-third (1/3) pipe sections or other arrangements approved as part of the final plat submission.
- T. *New Jersey Department of Environmental Protection Jurisdiction.* All drainage facilities carrying runoff from tributary areas larger than one-half (1/2) square mile or located within a floodplain must have the approval of the New Jersey Division of Water Policy and Supply for approval in accordance with statute. The state may retain jurisdiction, in which case a permit will be necessary as set forth, or may refer the matter to the Township Engineer for review.
- U. *Nonpipe Culverts.* All nonpipe culverts shall be designed for American Association of State Highway Officials H20-44 loading. All culverts of any type shall be carried to the roadway right-of-way and shall terminate with headwalls or other approved end treatment. All conduits terminating or beginning in

open channels shall be provided with headwalls or other appropriate end treatment.

- V. *Lakes.* Any lake construction in upland areas to provide waterfront lots for a residential development shall have a minimum area covered by water of at least five (5) acres and an average depth of water of not less than three (3) feet from May 1 to September 1 of each year.
- W. *Guiderails.* Guiderails and/or railing shall be placed at all drainage structures where the interests of pedestrians or vehicular safety would dictate. The Board may require that any open channel other than naturally occurring streams be fenced with forty-eight (48) inch chain link fencing if the banks of the channel are steeper than one (1) foot vertical for every four (4) feet horizontal and either the total depth of the channel exceeds four (4) feet or the channel would be expected to have a depth of flow greater than two (2) feet more often than once every ten (10) years. For maintenance purposes, gates may be required by the Board at specific intervals.