TOWN OF HOPE MILLS STORMWATER DRAINAGE DESIGN STANDARDS

This document lists the minimum stormwater drainage design standards for the Town of Hope Mills for residential and commercial development. For standards relative to the design of best management practices (BMPs) refer to the most recent edition of the North Carolina Department's of Environment and Natural Resources Stormwater BMP Manual.

A. Open Channel Hydraulics

1. Channels and swales shall convey the 10-year storm with low flow channels considered for larger channels (Q>100 cfs).
2. Channel slopes shall be a minimum 0.005 ft/ft.
3. Maximum side slopes for vegetated channels shall be 3:1. Maximum side slopes for riprap channels shall be 2:1. Steeper side slopes will be considered with appropriate stabilization.
4. Channels shall be designed so that velocities during the design storm are non-erosive. Refer to the NCDENR Erosion Control Manual for non-erosive velocities for various channel liners.

B. Closed Storm Drainage Systems

1. Inlets (on grade) shall accept 4 inches/hour storm intensity.
2. Inlets (sag) shall accept the 10-year storm.
3. Maximum spread shall be 6 feet from the edge of curb or edge of pavement if no curb is present.
4. Piped storm drainage systems shall convey the 10-year storm.
5. Minimum pipe slope shall be 0.005 ft/ft.
6. Maximum pipe slope shall be 0.1 ft/ft.
7. Maximum pipe length without a structure for maintenance shall be 300 feet. Blind junctions are not permitted.
8. Minimum pipe size shall be 15 inches in diameter.
9. Minimum pipe cover in the right-of-way shall be as follows:

Pipe Size (in.)	Clearance Distance (ft) From Pipe Invert to Subgrade
15	2.4
18	2.7
24	3.3
30	3.8

36	4.4
42	4.9
48	5.4
54	6.0
60	6.5
66	7.0
72	7.6

10. Minimum cover for pipes outside of the ROW is 1 foot.
11. All storm drainage pipes within the street ROW shall be reinforced concrete pipe Class III or higher.
12. Discharge points from storm drainage pipes shall be a minimum of 10 feet from the building envelope.

C. Culverts

1. Culverts shall provide the following level of service

   - Cross-drainage at FEMA streams – 100-year frequency

   - Cross-drainage under thoroughfares – 50-year frequency

   - Other culverts – 25-year frequency

2. Culverts should maintain a HW/D <1.2.
3. 1 foot of freeboard shall be provided for the design storm.
4. Outlet protection shall be provided where discharge velocities will cause erosion problems. Refer to the NCDENR Erosion Control Manual for design of outlet protection.

D. Storage and Detention

1. 1-year 24-hour duration discharge must be equal to or less than the pre-development 1-year 24-hour discharge for high density developments (see Section 67-88 of the Hope Mills Code of Ordinances)
2. 10-year 24-hour duration discharge must be equal to or less than the pre-development 10-year 24-hour discharge.
3. Watersheds that have well documented water quantity problems may have more stringent, or modified, design criteria such as controlling the 25-year 24-hour duration peak discharge rate to the predeveloped peak discharge rate.

Exemptions for detention requirements are as defined in Section 67-74 of the Hope Mills Code of Ordinances.

E. Easements

1. Drainage easements will be required by the Town for all open ditches, closed pipe systems, swales or other systems outside of public rights-of-way. Easements shall be centered over the culvert, pipe or watercourse.
2. Easement widths for closed pipe systems: the greater of 20 feet or 10' + (the diameter or total outside width for multiple pipes) + (2 x invert depth) rounded to nearest 5 foot increment.
3. Easement widths for open channels include the channel from top of bank to top of bank in addition to the following based on drainage area:

Drainage Area (ac)	Easement Width (ft) on each side of channel bank
<10	10
10 -<25	20
25 - <50	30
50 - <100	40
>100 ac	The greater of the floodway width or 50

4. Easement widths for BMPs shall be 20 feet beyond the top of bank or toe of slope, or the edge of BMP for subsurface BMPs as needed for maintenance. The Town's Stormwater Administrator may adjust the required easement width for a BMP on a case by case basis based on maintenance needs.