

Recommendations Developed by the Cumberland County Soil & Water Conservation District

Forest Lake NPS Sites on Lakeside Drive

Town of Windham

Report Date: August 20, 2018

A. Introduction

On July 10, 2018, Cumberland County Soil & Water Conservation District (CCSWCD) staff met with members of the Forest Lake Association (FLA), Lakeside Drive Road Association, James Way Road Association, and Cypress Hill Road Association to visit sites on Lakeside Drive where erosion was observed on previous site visits. CCSWCD staff attending the meeting included Adam Sellick, E.I., Assistant District Engineer. The purpose of the site visit was to provide technical recommendations/designs for at least one high priority water quality impact site in the Forest Lake Watershed as per CCSWCD's agreement with the FLA to assist with the Town of Windham's 2018 Watershed Grant awarded to FLA.

The sites visited on July 10, 2018 are as follows:

Site Number	Description
5-1	Intersection of Cypress Hill Drive and Lakeside Drive
5-2	Large stream crossing on Lakeside Drive just south of Cypress Hill Drive
5-5	Intersection of James Way and Lakeside Drive
5-6	Culvert crossing under Lakeside Drive near 111 Lakeside Drive
5-11	Double culvert crossing under Lakeside Drive near Glendale Road

Figure 1 provides the approximate location of these three sites.

The following report outlines CCSWCD's observations and recommendations for addressing erosion issues at each site.

B. Project Areas

The following sections describe each site visited, observations made at each site, and recommendations based on the observations at each site. **Figure 1** provides an overview of the sites in relation to Lakeside Drive.



Figure 1. Lakeside Drive Site Locations



1. Site 5-1: Intersection of Cypress Hill Drive and Lakeside Drive

The location of this site is on Lakeside Drive at the intersection of Cypress Hill Drive and Lakeside Drive. The site receives runoff from Cypress Hill Drive, which is a very steep, unpaved, plowed private road. The coordinates of the site are: 43°49'18.78"N 70°20'8.75"W.

Observations

CCSWCD staff made the following observations at this site:

1. Cypress Hill Drive is in poor condition toward the bottom of the hill, near the intersection. Stormwater runoff appears to have eroded sections of the road, causing channelized flow to develop toward the bottom of the hill (**Figure 2**).
2. The channelized flow from Cypress Hill Drive crosses Lakeside Drive and discharges onto the driveway of the property opposite Cypress Hill Drive. There are channels forming in Lakeside Drive perpendicular to Cypress Hill Road because of this flow (**Figure 3**).
3. There appears to be informal ditching on the southern side of Cypress Hill Drive. This ditching is grown in with vegetation. The northern side of Cypress Hill Drive is vegetated open area.

Recommendations

To address these observations, CCSWCD staff have made the following recommendations:

1. Cypress Hill Drive should be reestablished and regraded to send all sheet flow to the vegetated southern side of the road (i.e., no longer be crowned).
2. Speed bumps (either gravel or temporary plastic) should be installed on the road to direct runoff from the road into the vegetated area on the southern side of the road (**Figure 4**).
3. If erosion is observed in the vegetated area on the southern side of the road because of the increased runoff, consider installing riprap check dams in the vegetated area.



Figure 2. Evidence of channelized runoff coming off Cypress Hill Drive at Site 5-1 (facing west).





Figure 3. Evidence of channelized flow on Lakeside Drive (left to right) from Cypress Hill Drive, at Site 5-1 (facing south).



Figure 4. Red areas indicate orientation and potential locations of temporary speed bumps at Site 5-1 (facing east).



2. Site 5-2: Stream crossing on Lakeside Drive just south of Cypress Hill Drive

The location of this site is on Lakeside Drive just south of the intersection of Cypress Hill Drive and Lakeside Drive. The site is a precast concrete box culvert stream crossing with supporting gabion baskets that was installed after Hurricane Bob caused major flooding in 1991. The coordinates of the site are: 43°49'18.24"N 70°20'8.55"W.

Observations

CCSWCD staff made the following observations at this site:

1. The crossing appears to be in good condition. Residents reported that there had not been any flooding at the crossing since the installation.
2. The gabion baskets seem to be filled with sediment from the road, and there is vegetation beginning to grow out of them. The top of the basket is open in some areas (**Figure 5**).

Recommendations

To address these observations, CCSWCD staff have made the following recommendations:

1. The gabion baskets could benefit from being cleaned out, refilled with stone of appropriate size (if there are voids), and the wire re-secured. This will ensure that the stones will remain in the basket as designed.



Figure 5. Gabion baskets at Site 5-2 are open, filled with sediment, and have vegetation growing.



3. Site 5-5: Intersection of James Way and Lakeside Drive

The location of this site is the intersection of James Way and Lakeside Drive. The site receives runoff from both Lakeside Drive and James Way. The coordinates of the site are: 43°49'8.20"N 70°20'10.15"W.

Observations

CCSWCD staff made the following observations at this site:

1. Runoff from Lakeside Drive is channelizing and causing significant erosion along the road edges at the intersection of James Way and Lakeside Drive (**Figure 6**).
2. The southern side of James Way directs runoff into a roadside ditch that terminates at the intersection (**Figure 7**).
3. The northern side of James way is bermed at the top of the hill until it reaches the driveway nearest the intersection. Runoff flows along the driveway into a small vegetated area that appears to contain the runoff in small storms.
4. On Lakeside Drive north (uphill) of the intersection with James Way, the western side of the road is bermed and the properties are downhill toward the lake. The only runoff contributions from this side of the road appear to be from the road itself (**Figure 8**).
5. On Lakeside Drive north (uphill) of the intersection with James Way, the eastern side of the is not bermed, but does not appear to have any significant runoff contributions. The driveway at 24 Lakeside Drive may contribute a minor amount of flow. The primary runoff contributions from this side of the road appear to be from the road itself.
6. Erosion on Lakeside Drive south (downhill) of the intersection with James Way is not included in this report as the recommendations presented aim to reduce runoff that crosses the intersection.

Recommendations

To address these observations, CCSWCD staff have made the following recommendations:

1. Two NDS 24" deep "dry well" catch basins should be installed on either side of Lakeside Drive just north of where Lakeside Drive intersects with James Way (**Figures 9-11**) (**Exhibits A & B**). The catch basins should be configured to drain into subsurface soils by drilling out "weep holes" in the bottom. These catch basins should each be installed with a 24-inch vertical riser, depending on the subsurface conditions and the ability for the Road Association to perform maintenance, making them four (4) feet deep, overall. A deeper catch basin will be more effective at storing sediment but will be more difficult to maintain by hand.





Figure 6. Channelized runoff flowing south along the eastern side of Lakeside Drive toward the James Way intersection at Site 5-5.



Figure 7. Ditching on southern side of James Way at Site 5-5, facing Lakeside Drive.





Figure 8. Channelized runoff flowing south along the eastern side of Lakeside Drive at Site 5-5.

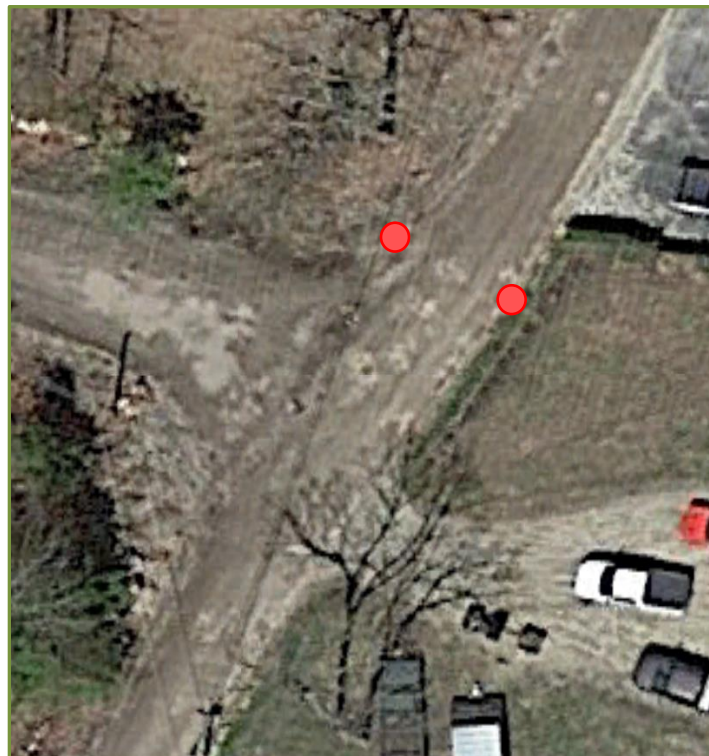


Figure 9. Proposed locations for two NDS 24" deep "dry well" catch basins on Lakeside Drive at Site 5-5 shown in red.





Figure 10. Proposed location of NDS 24-inch deep catch basin on east side of Lakeside Drive at Site 5-5.



Figure 11. Proposed location of NDS 24-inch deep catch basin on west side of Lakeside Drive at Site 5-5.



4. Site 5-6: Culvert crossing under Lakeside Drive near 111 Lakeside Drive

The location of this site is on Lakeside Drive, south of Site 5-5, near 111 Lakeside Drive. The site is a culvert crossing under Lakeside Drive that leads to a plunge pool. This plunge pool flows into a very long ~18" diameter culvert that leads directly into Forest Lake. This plunge pool and culvert system was installed by the previous owner of the property, who maintained the system while he lived there. The plunge pool and culverts were installed to convey an existing stream (which flowed from the opposite side of Lakeside Drive across the property) directly to the Lake. The coordinates of the site are: 43°49'5.99"N 70°20'11.21"W.

Observations

CCSWCD staff made the following observations at this site:

1. The inlet of the culvert is difficult to see due to the vegetation growth around it, but there are signs of sediment deposits leading to it and immediately upstream of it.
2. It appears the plunge pool has not been maintained for quite some time (**Figure 12**).
3. Runoff from the western side of Lakeside Drive turns out toward the culvert inlet. There are significant sediment deposits in the vegetation leading toward the culvert inlet (**Figure 13**).

Recommendations

To address these observations, CCSWCD staff have made the following recommendations:

1. Clearing the vegetation around the inlet of the culvert would allow for easier inspection of the culvert's condition.
2. The sediment running off the road toward the culvert inlet should be cleaned out and disposed of after rain events. This will prevent the sediment from reaching the lake.
3. The plunge pool requires routine maintenance to function as designed. The Road Association should coordinate with the landowner to acquire a maintenance easement so that the required maintenance can occur.





Figure 12. Plunge Pool at Site 5-6.



Figure 13. Runoff from Lakeside Drive enters the culvert inlet at Site 5-6.



Site 5-11: Double culvert crossing under Lakeside Drive near Glendale Road

The location of this site is on Lakeside Drive just south of the fork in the road near Glendale Road. The site includes a culvert crossing comprised of two parallel ~18" diameter corrugated metal pipe (CMP) culverts supported by a plunge pool on either side. The coordinates of the site are: 43°49'1.64"N 70°20'13.78"W.

Observations

CCSWCD staff made the following observations at this site:

1. The culverts appear to be in good condition structurally.
2. The plunge pools and surrounding areas could benefit from routine maintenance. There are significant sediment deposits in each plunge pool and vegetation growing on either side of the culverts (**Figure 14**).
3. There is ditching on the west side of Lakeside Drive leading to the crossing, but not on the east side. Sediment deposits can be seen along the road and into the wooded area where runoff is pushing road material downhill (**Figure 15**).

Recommendations

To address these observations, CCSWCD staff have made the following recommendations:

1. Implement routine maintenance at the culvert crossing to remove vegetation and sediment. The plunge pools should be restored to their original shape and function and be regularly maintained.
2. Monitor the sediment deposits on the eastern side of the site to make sure the sediment is not transported to a third culvert downstream, on Glendale Road. If sediment begins to reach the the Glendale Road culvert, contact CCSWCD for further recommendations.



Figure 14. Sediment deposit in the downstream plunge pool at Site 5-11.





Figure 15. Sediment is being transported along the eastern side of Lakeside Drive as the road approaches Site 5-11.



C. Exhibits

- A. NDS Drainage Catalog (24-inch Catch Basin Section)
- B. NDS 24-inch Catch Basin Installation Detail





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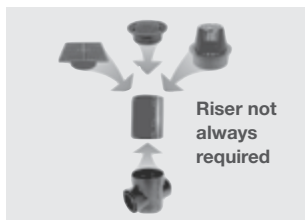
Available in a range of sizes from 6" round to 24" square, and with various grating and filter options for commercial and residential systems.

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NDS offers a complete line of catch basins and grates for residential and commercial stormwater management solutions. NDS catch basins have sump areas that collect debris and prevent clogging of the pipeline, and grates are available in a variety of patterns and colors to blend in with surrounding surfaces. Depending on the size of the round, square, or atrium grates, they may fit directly into a riser of pipe, sewer and drain fitting, or our catch basins.



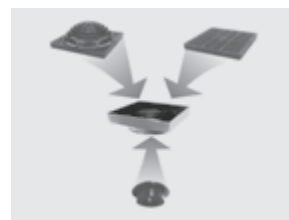
Small Grates



Speed-D® Basin



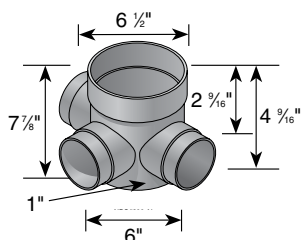
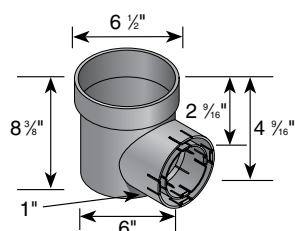
Large Catch Basin




Adapter

Speed-D® Basins

Use our compact 6" round Speed-D Basins with grates to collect runoff water while its sump area collects debris and prevents clogging. Also use Speed-D Basins with 6" Pop-Up Emitters to provide a point of discharge or overflow in a drainage system.



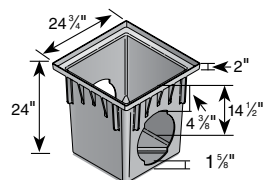
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
101	1 - 3" and 4" Locking Outlet	Black	10	1.60	10ND	6" styrene catch basin with locking outlet. 68 GPM per outlet capacity. 
101ATBLKIT	Spee-D Basin with 6" Black Atrium Grate	Black Grate	8	n/a	10ND	
101GRKIT	Spee-D Basin with 6" Green Round Grate	Green Grate	6	n/a	10ND	
101SQGRKIT	Spee-D Basin with 9" x 9" Green Square Grate	Green Grate	8	n/a	10ND	
201	3" and 4" Locking Outlets*	Black	10	1.83	10ND	Kits contain 1-outlet Spee-D Basin & Grate as described.
Spee-D Basins and kits fit 3" or 4" Sewer & Drain Pipe, 3" or 4" Corrugated Pipe, 4" Sch. 40 and 3" & 4" Triple Wall Pipe. Use new Spee-D Riser or 6" Sewer and Drain Pipe as a riser for all 6" round catch basins. Use waterproof silicone to make water-tight connections. Locking Outlet snaps on to most 3" and 4" corrugated pipe.						

Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
101R	Spee-D Basin Riser	Black	n/a	n/a	10ND	6" Riser for Spee-D Basin. Styrene.
	Use with any Spee-D Basin to add from 2" to 6" to top of basin. Can be cut to size and has guidelines in 1" increments. Compatible with all grates that fit Spee-D Basin.					

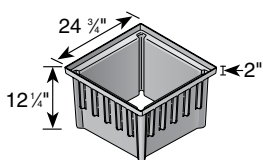
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
250	2 - 3" and 4" 90° Outlets	Black	12	1.64	10ND	6" styrene catch basin with locking outlet. 83 GPM per outlet capacity.
300	3 - 3" and 4" Outlets	Black	12	1.82	10ND	
350	3" and 4" Outlets	Black	12	2.00	10ND	
Fit 3" or 4" Sewer & Drain Pipe, 3" or 4" Corrugated Pipe, 4" Sch. 40 and 3" & 4" Triple Wall Pipe. Use 6" Sewer and Drain Pipe as a riser for all 6" round catch basins. Use waterproof silicone to make water-tight connections.						

CATCH BASINS

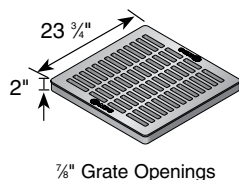
24" Catch Basin Series




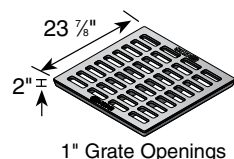
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
2400	24" x 24" Catch Basin, 2 Openings	Black	1	18.00	10ND	24" x 24" One-Piece Tapered Catch Basin. HDPE with Structural Foam.
2404	24" x 24" Catch Basin, 4 Openings	Black	1	15.00	10ND	
	Requires 2 or 4 #2410 Universal Outlets.					




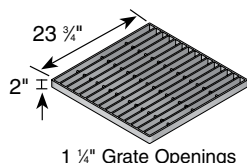
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
2418	24" x 24" Catch Basin Extension (No Bottom)	Black	1	14.60	10ND	8" Extension for 24" x 24" Catch Basin. HDPE with Structural Foam.
Use with 24" x 24" Catch Basin Series.						



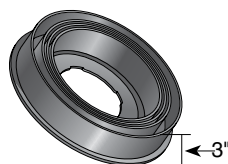
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
2411	24" x 24" Square Grate	Black	1	19.75	10ND	24" Square HDPE with Structural Foam Grate with UV inhibitor. Open surface area 231.69 square inches. 708.77 GPM.
2412	24" x 24" Square Grate	Green	1	19.75	10ND	
	Use with 24" x 24" Catch Basin Series. (see page 75)					



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
2413	24" x 24" Square Cast Iron Grate	Black	1	147.00	10ND	24" Square Heavy-Duty Cast Iron Grate. Open surface area 197.00 square inches. 602.65 GPM. Structural Foam.
	Use with 24" x 24" Catch Basin Series. (see page 75)					



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
2415	24" x 24" Square Galvanized Steel Grate	Galvanized Steel	1	62.88	10ND	24" Square Heavy-Duty Galvanized Steel Bar Grate. Open surface area 422.45 square inches. 1292.33 GPM. Structural Foam.
	Use with 24" x 24" Catch Basin Series. (see page 75)					



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
2410	10" & 12" Universal Adapter	Black	1	4.20	10ND	10"/12" Universal Adapter. HDPE.
	Includes #1890 (comes pre-inserted). Fits 10" and 12" Sewer and Drain Pipe; 10" and 12" Dual Wall Corrugated Pipe; 12" Single Wall Corrugated Pipe (does not fit 10" Single Wall Corrugated Pipe). Reduces opening to fit most 3" to 8" adapters above (all except #1889) for use with 3", 4", 6" and 8" Sewer and Drain Pipe; 3", 4", 6" and 8" Corrugated Pipe; and 4" Sch. 40 Pipe (select corresponding adapter above). Use with 24" Catch Basin Series.					



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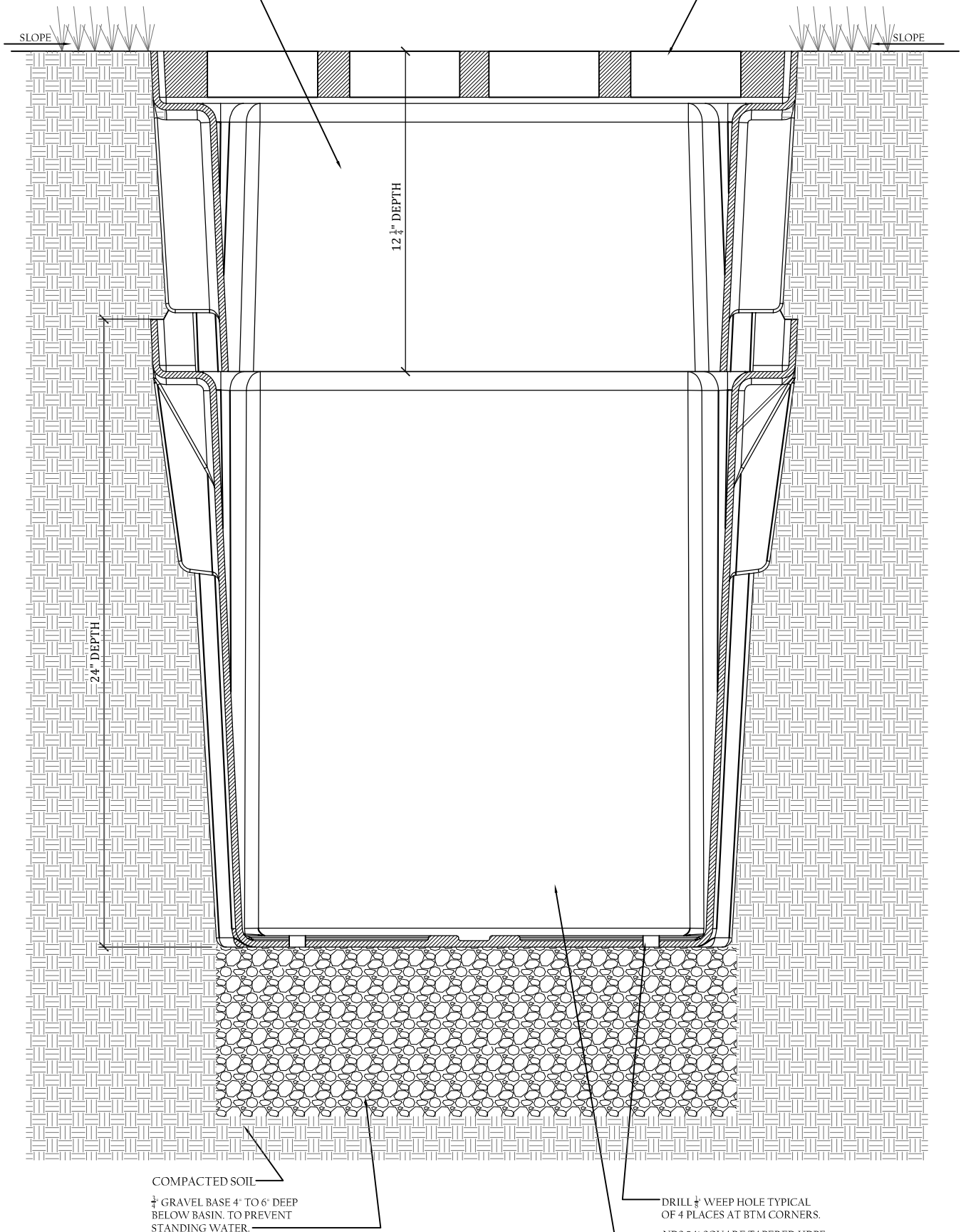
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- DO NOT USE OVER 5 RISERS WITH CATCH BASIN.

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