

**SECTION 5A  
TEMPORARY STRUCTURAL MEASURES  
FOR  
EROSION AND SEDIMENT CONTROL**

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# STANDARD AND SPECIFICATIONS FOR EARTH DIKE



For drainage areas larger than 10 acres, refer to the Standard and Specifications for Diversion on page 5B.1.

## Stabilization

Stabilization of the dike shall be completed within 7 days of installation in accordance with the standard and specifications for seed and straw mulch or straw mulch only if not in seeding season and flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade <sup>1</sup>	Flow Channel	
		A (<5 Ac.)	B (5-10 Ac)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP, sod, or lined with plastic or 2 in. stone
3	5.1-8.0%	Seed and cover with RECP, Sod, or line with plastic or 2 in. stone	Line with 4-8 in. stone or, Recycled Concrete Equivalent <sup>2</sup> or geotextile
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent <sup>2</sup> or geotextile	Site Specific Engineering Design

## Definition

A temporary berm or ridge of compacted soil, located in such a manner as to channel water to a desired location.

## Purpose

The purpose of an earth dike is to direct runoff to a sediment trapping device, thereby reducing the potential for erosion and off site sedimentation. Earth dikes can also be used for diverting clean water away from disturbed areas.

## Conditions Where Practice Applies

Earth dikes are often constructed across disturbed areas and around construction sites such as graded parking lots and subdivisions. The dikes shall remain in place until the disturbed areas are permanently stabilized.

## Design Criteria

See Figure 5A.1 on page 5A.2 for details.

### General

	Dike A	Dike B
Drainage Area	<5 Ac	5-10 Ac
Dike Height	18 in.	36 in.
Dike Width	24 in.	36 in.
Flow Width	4 ft.	6 ft.
Flow Depth in Channel	8 in.	15 in.
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

<sup>1</sup> In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.

<sup>2</sup> Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

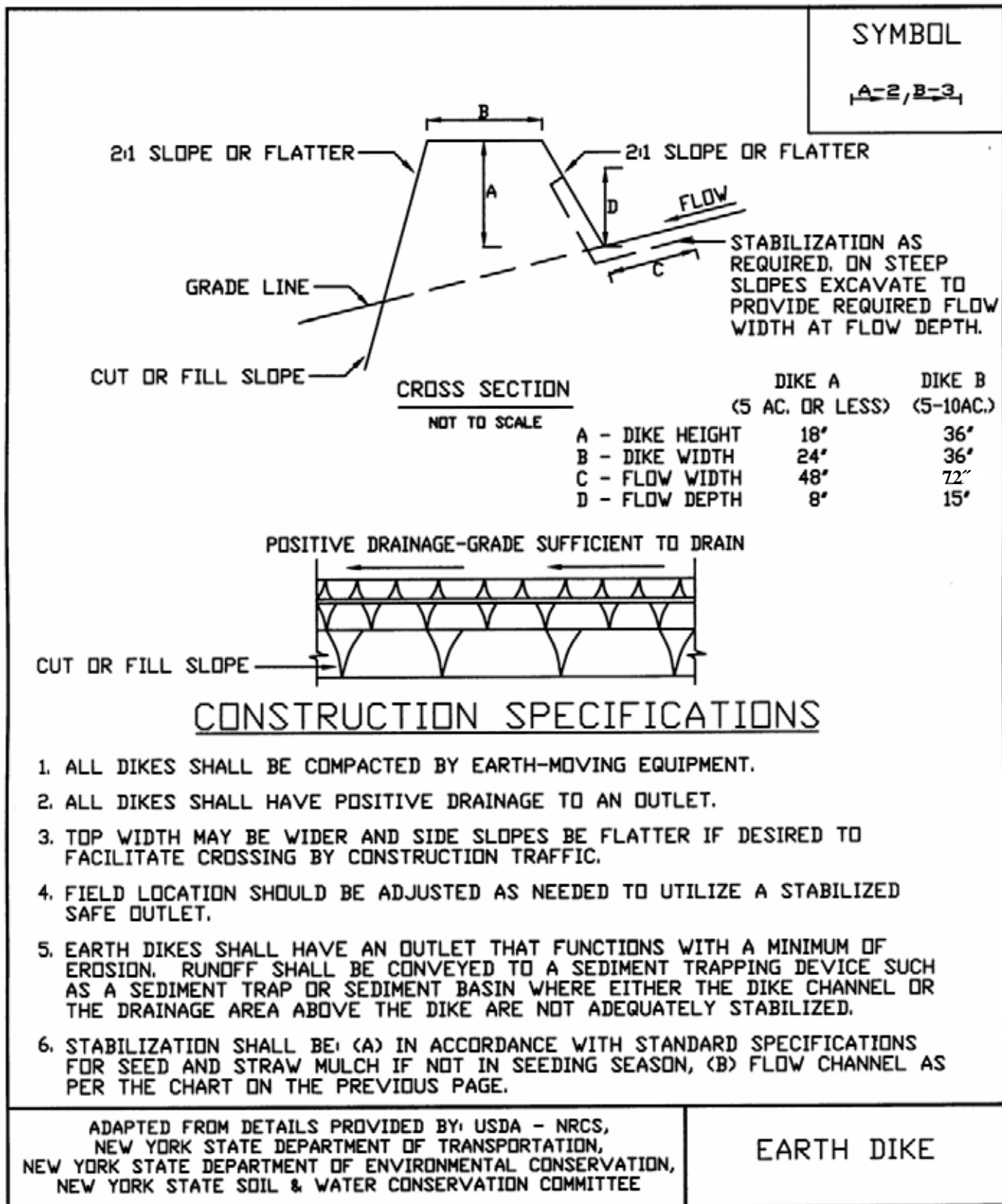
### Outlet

Earth dikes shall have an outlet that functions with a minimum of erosion.

Runoff shall be conveyed to a sediment trapping device until the drainage area above the dike is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

**Figure 5A.1  
Earth Dike**



# STANDARD AND SPECIFICATIONS FOR TEMPORARY SWALE



	<u>Swale A</u>	<u>Swale B</u>
Drainage Area	<5 Ac	5-10 Ac
Bottom Width of Flow Channel	4 ft	6 ft
Depth of Flow Channel	1 ft	1 ft
Side Slopes	2:1 or flatter	2:1 or flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specification for Waterways on page 5B.11.

### **Stabilization**

Stabilization of the swale shall be completed within 7 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

Type of Treatment	Channel Grade <sup>1</sup>	Flow Channel	
		A (<5 Ac.)	B (5-10 Ac)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with RECP, Sod, or lined with plastic or 2 in. stone
3	5.1-8.0%	Seed and cover with RECP, Sod, or line with plastic or 2 in. stone	Line with 4-8 in. or stone or Recycled Concrete Equivalent <sup>2</sup> or geotextile
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent <sup>2</sup> or geotextile	Site Specific Engineering Design

### **Definition**

A temporary excavated drainage way.

### **Purpose**

The purpose of a temporary swale is to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment laden water and divert it to a sediment trapping device.

### **Conditions Where Practice Applies**

Temporary swales are constructed:

1. to divert flows from entering a disturbed area.
2. intermittently across disturbed areas to shorten overland flow distances.
3. to direct sediment laden water along the base of slopes to a trapping device.
4. to transport offsite flows across disturbed areas such as rights-of-way.

Swales collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

### **Design Criteria**

See Figure 5A.2 on page 5A.5 for details.

<sup>1</sup> In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.

<sup>2</sup> Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

## **Outlet**

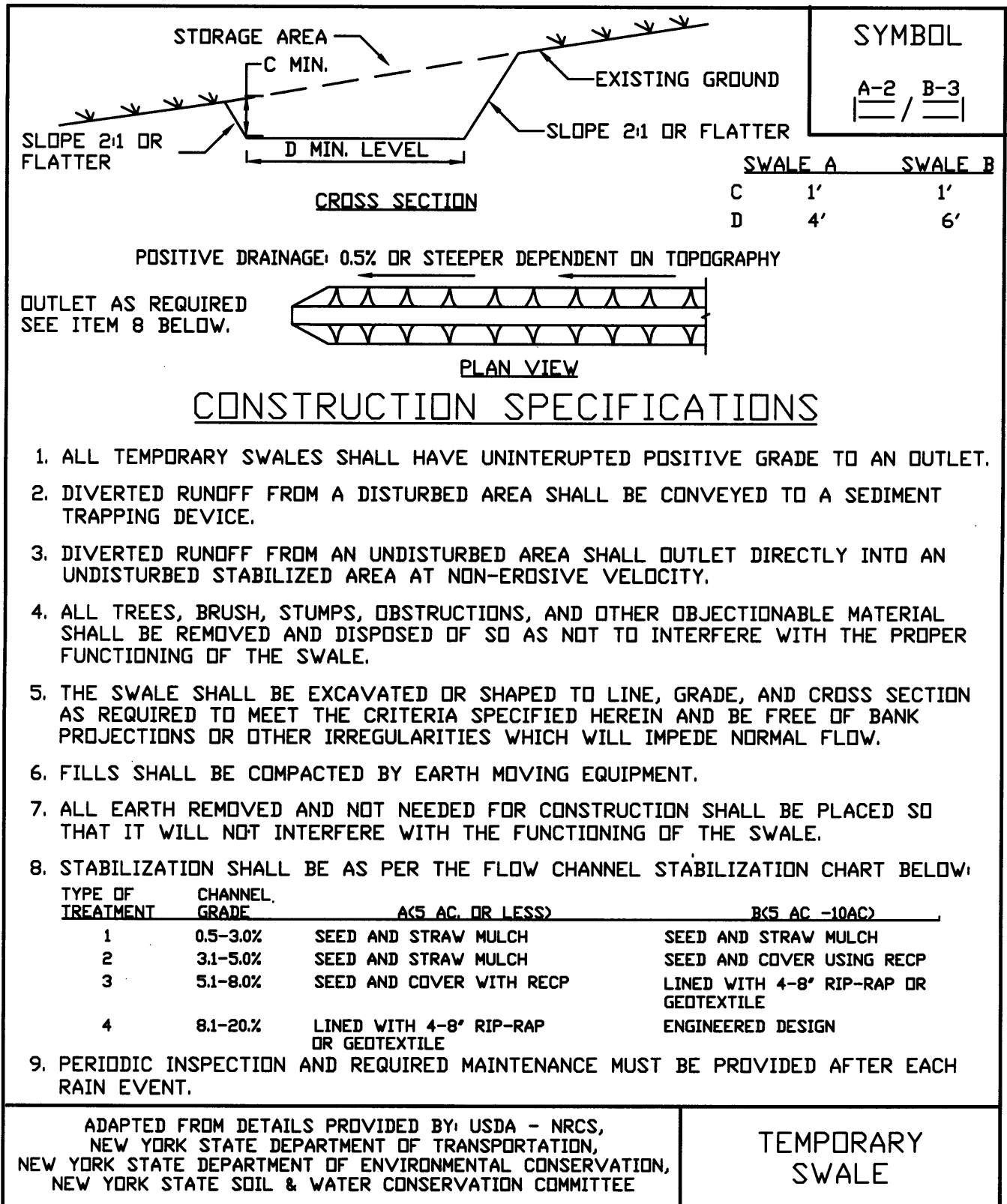
Swale shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the swale is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet condition.

If a swale is used to divert clean water flows from entering a disturbed area, a sediment trapping device may not be needed.

**Figure 5A.2  
Temporary Swale**



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# STANDARD AND SPECIFICATIONS FOR PERIMETER DIKE/SWALE



## **Definition**

A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area.

## **Purpose**

The purpose of a perimeter dike/swale is to prevent off site storm runoff from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

## **Conditions Where Practice Applies**

Perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along tops of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

## **Design Criteria**

See Figure 5A.3 on page 5A.8 for details.

The perimeter dike/swale shall not be constructed outside the property lines without obtaining legal easements from affected adjacent property owners. A design is not required for perimeter dike/swale. The following criteria shall be used:

**Drainage area** – Less than 2 acres (for drainage areas larger than 2 acres but less than 10 acres, see earth dike or temporary swale; for drainage areas larger than 10 acres, see standard and specifications for diversion).

**Height** – 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

**Bottom width of dike** – 2 feet minimum.

**Width of swale** – 2 feet minimum.

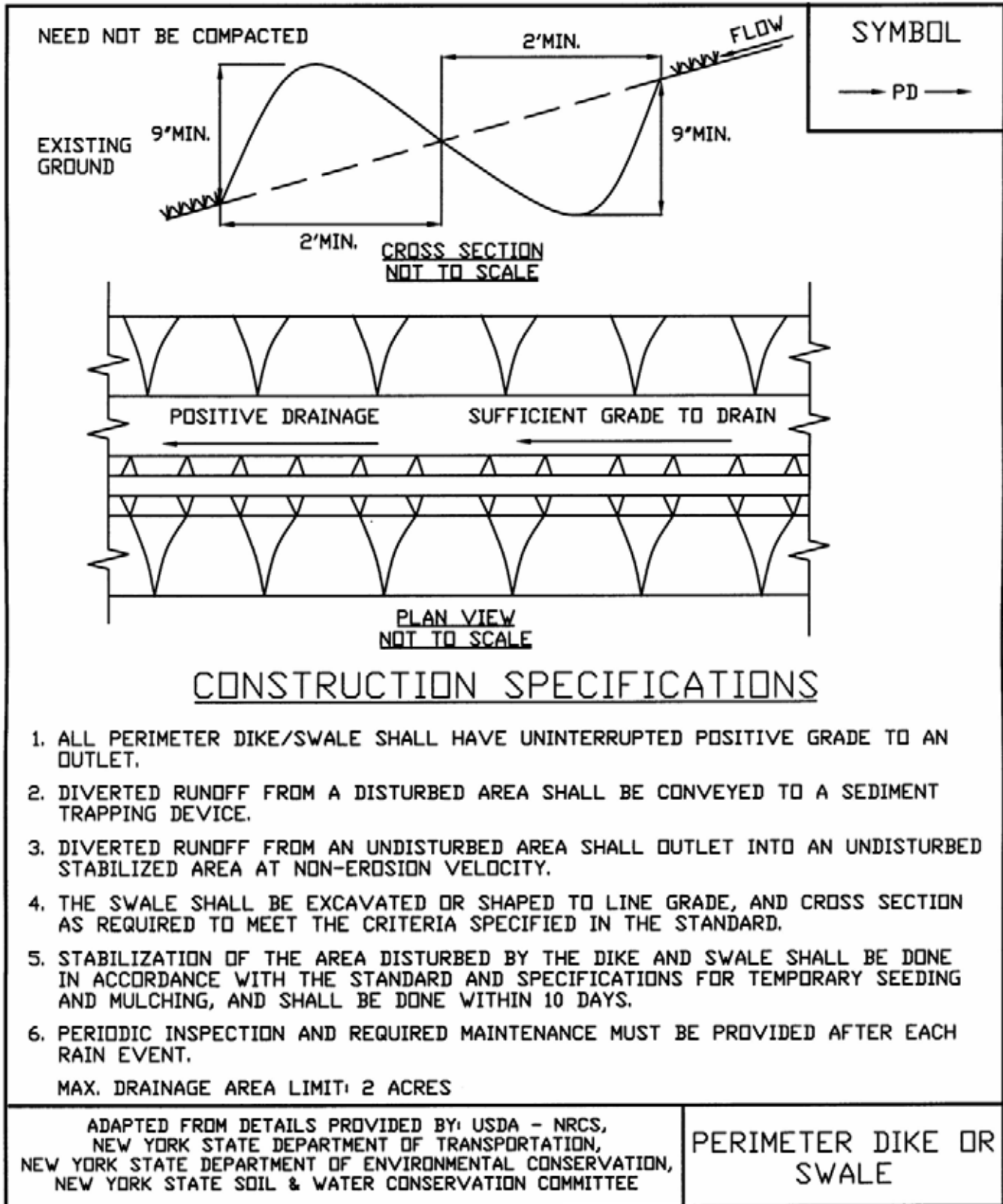
**Grade** – Dependent upon topography, but shall have positive drainage (sufficient grade to drain) to an adequate outlet. Maximum allowable grade not to exceed 8 percent.

**Stabilization** – The disturbed area of the dike and swale shall be stabilized within 7 days of installation, in accordance with the standard and specifications for temporary swales.

## **Outlet**

1. Perimeter dike/swale shall have a stabilized outlet.
2. Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.
3. Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap, sediment basin, or to an area protected by any of these practices.
4. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

**Figure 5A.3**  
**Perimeter Dike/Swale**



# STANDARD AND SPECIFICATIONS FOR TEMPORARY STORM DRAIN DIVERSION



## **Definition**

The redirection of a storm drain line or outfall channel so that it may temporarily discharge into a sediment trapping device.

## **Purpose**

To prevent sediment laden water from entering a watercourse, public or private property through a storm drain system, or to temporarily provide underground conveyance of sediment laden water to a sediment trapping device.

## **Conditions Where Practice Applies**

One of the following practices or procedures shall be used whenever the off-site drainage area is less than 50 percent of the on-site drainage area to that system. A special exception may be given, at the discretion of the local plan approval agency, where site conditions make this procedure impossible.

### **Method of Temporary Diversion**

1. Construction of a sediment trap or basin below a permanent storm drain outfall. Temporarily diverts storm flow into the basin or trap constructed below permanent outfall channel.
2. In-line diversion of storm drain at an inlet or manhole, achieved by installing a pipe stub in the side of a manhole or inlet and temporarily blocking the permanent outfall pipe from that structure. A temporary outfall ditch or pipe may be used to convey

storm flow from the stub to a sediment trap or basin. This method may be used just above a permanent outfall or prior to connecting into an existing storm drain system.

3. Delay completion of the permanent storm drain outfall and temporarily divert storm flow into a sediment basin or trap. Earth dike, swale or design diversion is used, depending on the drainage area, to direct flow into a sediment basin or trap. The basin or trap should be constructed to one side of the proposed permanent storm drain location whenever possible.

4. Installation of a stormwater management basin early in the construction sequence. Install temporary measures to allow use as a sediment basin. Since these structures are designed to receive storm drain outfalls, diversion should not be necessary.

## **Completion and Disposition**

When the areas contributing sediment to the system have been stabilized, procedures can be taken to restore the system to its planned use.

The following removal and restoration procedure is recommended:

1. Flush the storm drain system to remove any accumulated sediment.
2. Remove the sediment control devices, such as traps, basins, dikes, swales, etc.
3. For sites where an inlet was modified, brick shut the temporary pipe stub and open the permanent outfall pipe.
4. Establish permanent stabilized outfall channel as noted on the plans.
5. Restore the area to grades shown on the plan and stabilize with vegetative measures.
6. For basins that will be converted to stormwater management, remove the accumulated sediment, open the low flow orifice, and seed all disturbed areas to permanent vegetation.

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# STANDARD AND SPECIFICATIONS FOR WATER BAR



## **Definition**

A ridge or ridge and channel constructed diagonally across a sloping road or utility right-of-way that is subject to erosion.

## **Purpose**

To limit the accumulation of erosive velocity of water by diverting surface runoff at pre-designed intervals.

## **Conditions Where Practice Applies**

Where runoff protection is needed to prevent erosion on sloping access right-of-ways or either long, narrow sloping areas generally less than 100 feet in width.

## **Design Criteria**

Design computations are not required.

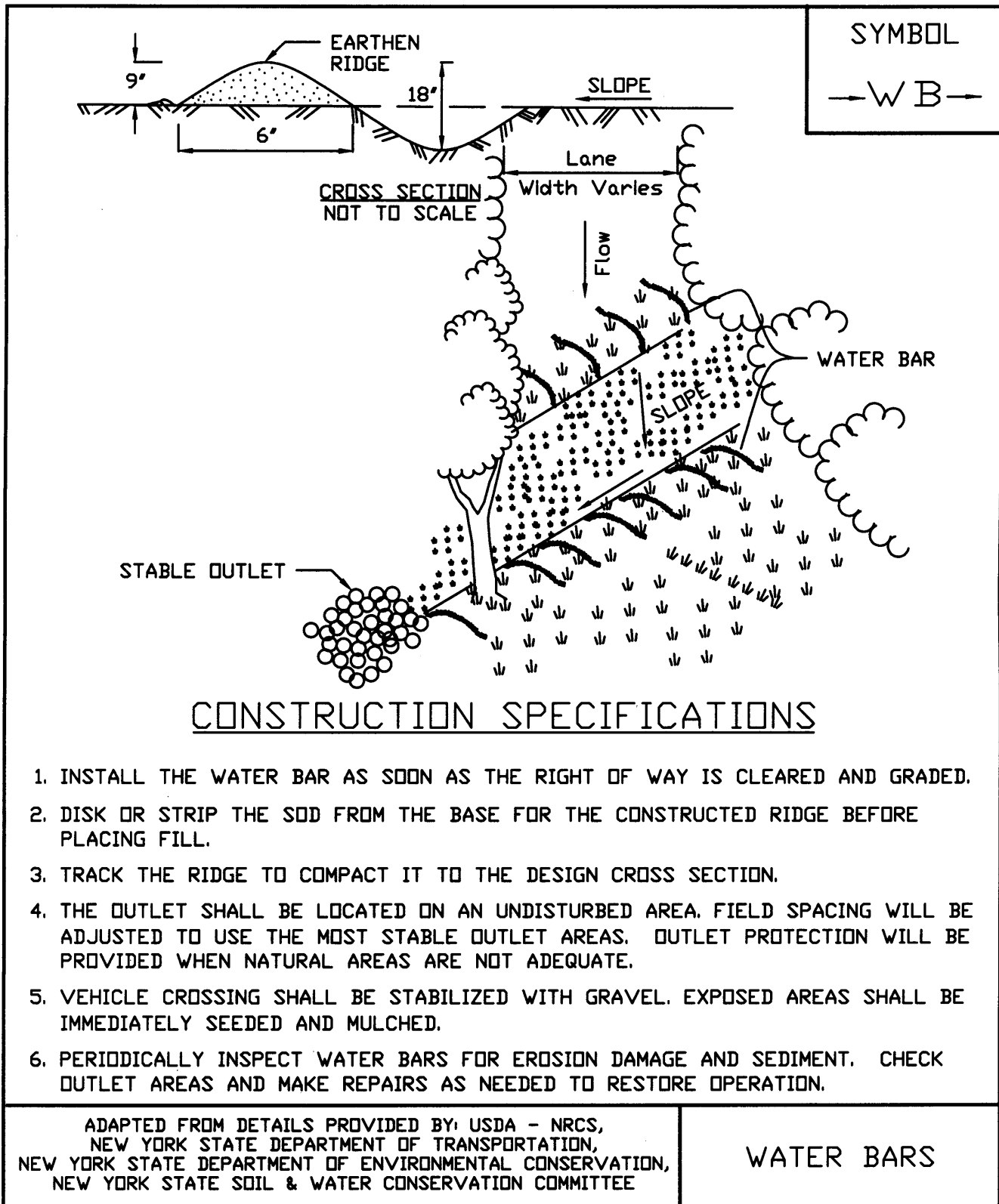
1. The design height shall be minimum of 12 inches measured from channel bottom to ridge top.
2. The side slopes shall be 2:1 or flatter, a minimum of 4:1 where vehicles cross.
3. The base width of the ridge shall be six feet minimum.
4. The spacing of the water bars shall be as follows:

<u>Slope (%)</u>	<u>Spacing (ft)</u>
<5	125
5 TO 10	100
10 TO 20	75
20 TO 35	50
>35	25

5. The positive grade of the water bar shall not exceed 2%. A crossing angle of approximately 60 degrees is preferred.
6. Once diverted, water must be conveyed to a stable system (i.e. vegetated swale or storm sewer system). Water bars should have stable outlets, either natural or constructed. Site spacing may need to be adjusted for field conditions to use the most suitable areas for water disposal.

See Figure 5A.4 for details.

**Figure 5A.4  
Water Bar**



# STANDARD AND SPECIFICATIONS FOR LEVEL SPREADER



## **Definition**

A temporary non-erosive outlet for concentrated runoff, constructed to disperse flow uniformly across a slope.

## **Purpose**

To convert concentrated flow to sheet flow and release it uniformly over a stabilized area.

## **Conditions Where Practice Applies**

Where sediment-free storm runoff can be released in sheet flow down a stabilized slope without causing erosion; where a level lip can be constructed without filling; where the area below the level lip is uniform with a slope of 10% or less and the runoff will not re-concentrate after release; and where no traffic will be allowed over spreader.

## **Design Criteria**

The design capacity shall be determined by estimating the peak flow from the 10-year storm. The drainage area shall be restricted to limit the maximum flows into the spreader to 30 cfs. The level spreader shall have the following minimum dimension:

Design Flow (cfs)	Minimum		End	
	Entrance Width (ft.)	Depth (ft.)	Width (ft.)	Length (ft.)
0-10	10	0.5	3	10
10-20	16	0.6	3	20
20-30	24	0.7	3	30

A transition section 20 feet in length shall be constructed from the width of the diversion or channel to the width of the spreader to ensure uniform outflow. This last transition section will blend the diversion grade to zero grade at the beginning of the spreader.

Construct the level lip in undisturbed soil to a uniform height and zeros grade over the length of the spreader. Protect the lip with an erosion resistant material or mat to prevent erosion and allow vegetation to become established.

The outlet area should be a generally smooth, well-vegetated areas no steeper than 10 percent.

See Figure 5A.5 on page 5A.14 for details.

**Figure 5A.5  
Level Spreader**

