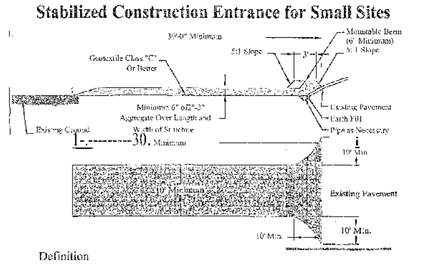
Stabilized Construction Entrance for Small Sites



Definition

A stabilized layer of aggregate that is underlain with Geotextile Class "C" (See Standards for Geotextiles). Stabilized entrances are located at any point where traffic leaves or leaves a construction site.

Purpose

The purpose of the stabilized construction entrance is to reduce tracking of sediment onto streets or public rights-of-way and provide a stable area for entrance or exit from the construction site.

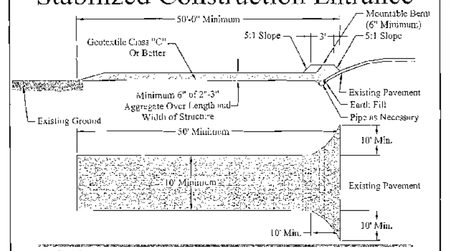
Conditions where the Practice Applies

1. Stabilized construction entrances shall be located at points of construction ingress and egress.
2. For single family residences, the entrance should be located at the permanent driveway.
3. Stabilized construction entrances should not be used on existing pavement.

Design Criteria

1. Length - Minimum of 30-60' (10-60' for single residence lot).
   Width - Minimum of 10-60', should be flared at the access to provide a turning radius.
2. Geotextile Class "C" shall be placed over the existing ground prior to placing stone. The Plan approval authority may not require geotextile fabric for single family residence.
3. Stone-crushed aggregate 2"-3" (See Standards for Geotextile and Rock). Recycled concrete equivalent may be used also. The stone should be placed at least 6" deep over the length and width of the entrance.
4. Surface Water - All the surface water flowing or diverted toward construction entrances shall be piped under the entrance to maintain positive drainage. Pipe installed under the construction entrance shall be protected with a mountable berm. The pipe shall be sized according to the drainage, with the minimum diameter being 6".
5. Location - A stabilized construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Options for limiting the site avail travel over the entire length of the stabilized construction entrance.

Stabilized Construction Entrance



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   Width - Minimum of 10-60', should be flared at the access to provide a turning radius.
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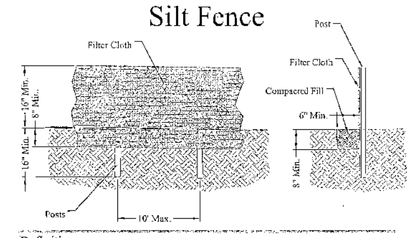
Silt Fence



Definition

A temporary barrier of Geotextile Class "F" used to intercept sediment laden runoff from small drainage areas.

Purpose

The purpose of silt fence is to reduce runoff where velocity and allow the deposition of transported sediment to occur. Erosion impacted by ultraviolet light on the stability of the fabric will shorten the maximum period that the silt fence may be used.

1. Silt fence provides a barrier that can collect and hold debris and soil, preventing the material from entering critical areas, streams, streets, etc.
2. Silt fence can be used where the installation of a dike would destroy sensitive areas, woods, wetlands, etc.

Conditions where the Practice Applies

Silt Fence is limited to intercepting sheet flow runoff from limited distances according to slope. It provides filtering and velocity dissipation to promote gravity settling of sediment.

Design Criteria

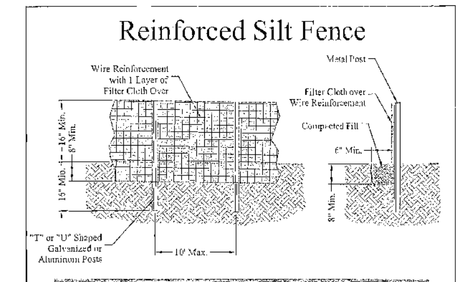
Wood or Steel Posts may be used in certain instances. Silt fence should be placed as close to the contour as possible. No section of silt fence should exceed a grade of 5 percent for a distance more than 50 feet. Where ends of the geotextile fabric come together, the ends shall be overlapped, folded, and stapled to prevent sediment bypass.

* if wood post are to be used they must meet the following specifications:
  1.5" X 1.5" minimum square posts, or 1.5" minimum diameter round post
* If metal posts are to be used they must be standard "T" or "U" post weighing not less than 1 lb. per linear foot.

The length of the flow contributing to silt fence shall conform to the following limitations.

Slope (%)	Slope Steepness	Slope Length (ft.) Maximum	Silt Fence Length (ft.) (Maximum)	
1	0-50:1	0-50:1	Unlimited	Unlimited
2-10	50:1-10:1	125	1,000	
10-20	10:1-5:1	100	750	
20-33	5:1-3:1	60	500	
33-50	3:1-2:1	40	250	
50+	2:1	20	125	

Reinforced Silt Fence



Definition

A temporary barrier of Geotextile Class "F" over wire reinforcement used to intercept sediment laden runoff from small drainage areas.

Purpose

The purpose of silt fence is to reduce runoff where velocity and allow the deposition of transported sediment to occur. Erosion impacted by ultraviolet light on the stability of the fabric will shorten the maximum period that the silt fence may be used.

1. Silt fence provides a barrier that can collect and hold debris and soil, preventing the material from entering critical areas, streams, streets, etc.
2. Silt fence can be used where the installation of a dike would destroy sensitive areas, woods, wetlands, etc.

Conditions where the Practice Applies

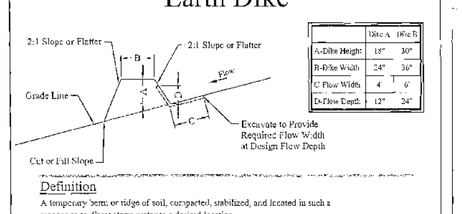
Silt Fence is limited to intercepting sheet flow runoff from limited distances according to slope. It provides filtering and velocity dissipation to promote gravity settling of sediment.

Design Criteria

Steel posts must be used. Silt fence should be placed as close to the contour as possible. No section of silt fence should exceed a grade of 5 percent for a distance more than 50 feet. Where ends of the geotextile fabric come together, the ends shall be overlapped, folded, and stapled to prevent sediment bypass. The length of the flow contributing to silt fence shall conform to the following limitations.

Slope (%)	Slope Steepness	Slope Length (ft.) (Maximum)	Silt Fence Length (ft.) (Maximum)	
6-10	6-10:1	Unlimited	Unlimited	
10-20	10:1-5:1	500	1,000	
20-33	5:1-3:1	400	1,000	
33-50	3:1-2:1	300	500	
50+	2:1 +	200	250	

Earth Dike



	Dim. A	Dim. B
A-Dike Height	18"	30"
B-Dike Width	24"	36"
C-Flow Width	4	6'
D-Flow Depth	13"	24"

Definition

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

Purpose

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

Conditions where the Practice Applies

Earth dikes are often constructed across disturbed areas and around construction inlet sediment traps on parking lots and road shoulders. The dikes shall remain in place until the disturbed area are permanently stabilized.

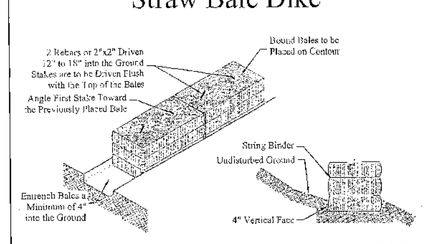
Earth dikes are constructed:

1. To divert pollutant laden runoff from a disturbed area to a sediment trapping device.
2. Across disturbed areas to shorten overland flow distances.
3. To direct or divert flows down slopes along the face of slopes to a trapping device.
4. To direct clean water from an undisturbed area to a stabilized outlet. Runoff shall be discharged at a non-erosive velocity.

Design Criteria

The basis for the engineering design shall be the 2 year 24-hour duration storm using NRCS criteria, assuming the worst and cover conditions to prevail in the contributing drainage area over the life of the earth dike. Manning's Equation shall be used to determine earth dike flow channel velocities associated with the developed discharge. The Manning's Roughness coefficients to be used in the equation are 0.025 for seed and mulch, 0.03 for seed stabilization matting or sod, and 0.05 for stone over 0.045 for flow depths up to 1' (Dike A) and 0.038 for flow depths between 1 and 2 feet (Dike B). Allowable flow channel velocities shall be less than 4 fps for seed and mulch, less than 6 fps for stabilization matting or sod, and less than 8 fps for 4"-7" stone.

Straw Bale Dike



Definition

Straw bale dikes are temporary barriers of straw or similar material used to intercept and direct no flow runoff.

Purpose

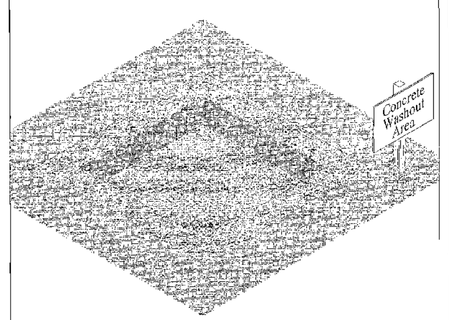
The straw bale dike filters sediment from runoff so that deposition of transported sediment can occur. The straw bale dike is used to intercept or direct sediment laden runoff to a sediment trap so that deposition of transported sediment can occur.

Conditions where the Practice Applies

1. The use of straw bale dikes is not recommended as a primary sediment control device.
   Straw bale dikes require and demand frequent and regular frequent maintenance.
2. Straw bale dikes can be used to intercept sheet flow only. They cannot be used as velocity checks in swales, or placed where they will intercept concentrated flow.
3. Straw bale dikes can be used only on projects that will be completed within three months.
4. Straw bale dikes should be used on slopes extending 2:1.
5. The length of straw bale dikes must conform to the following limitations:

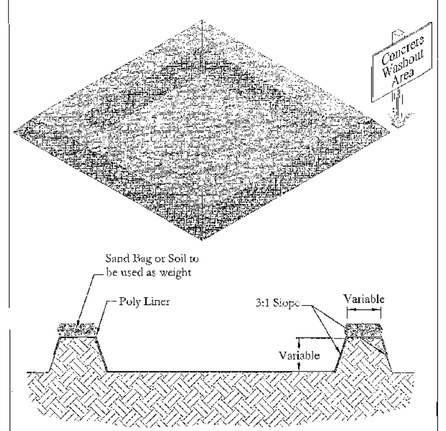
Slope (%)	Slope Steepness	Slope Length (ft.)	Silt Fence Length (ft.)
0-2	Flatter than 50:1	500	500
2-10	50:1 to 10:1	125	500
10-20	10:1 to 5:1	100	500

Concrete Washout Area

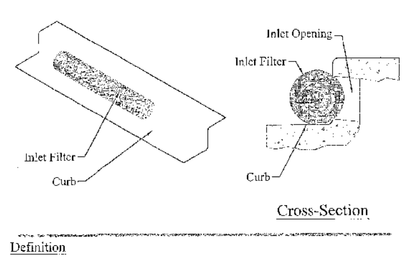


Concrete Washout Area

For use in High Water Table Areas



Curb Storm Drain Inlet Filter



Cross-Section

Definition

A filter constructed around a storm drain inlet.

Purpose

Storm drain inlet protection is used to filter sediment laden runoff before it enters the storm drain system.

Conditions where the Practice Applies

Storm drain inlet protection is a secondary sediment control device and is not to be used in place of a sediment trapping device unless approved by the appropriated approval authority.

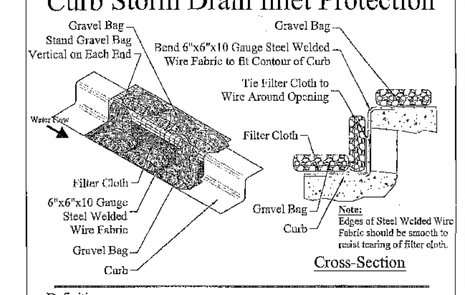
Design Criteria

Storm drain inlet protection shall be used when the drainage area to an inlet is disturbed and the following conditions prevail:

1. It is not possible to temporarily divert the storm drain outfall into a sediment trapping device.
2. Watershed blocking of the inlet is not advisable.
3. Drainage area is less than 1/4 acre for curb or standard inlet protections and 1 acre for elevated or yard inlets. For yard inlets, the total drainage area must be 1 acre or less and the contributing drainage area must have slopes flatter than 5 percent. Maintenance requirements for storm drain inlet protection are intense, due to the susceptibility to clogging. When the structure does not drain completely within 24 hours after a storm event, it is clogged. When this occurs, accumulated sediment must be removed and the geotextile fabric or filtering device must be cleaned and replaced.

Several methods of covering inlets have been developed recently. It is important to use methods that have been proven effective. Inlets hold sediments. Some methods do not allow ponding of storm water due to the possibility of increased flooding. Several other important design considerations include traffic safety, stabilization of sediment at the ends and underneath the filter cloth, and prevention of the filter entering the inlet.

Curb Storm Drain Inlet Protection



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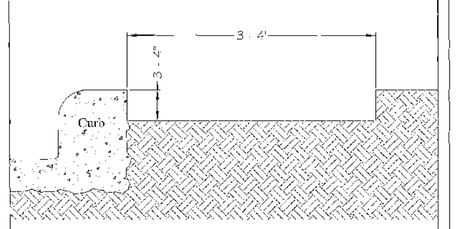
Cut Back Curb



Definition

A temporary sediment trap formed by excavation behind the curb.

Purpose

The purpose is to intercept sediment laden runoff from the lot during construction and retain sediment on the lot.

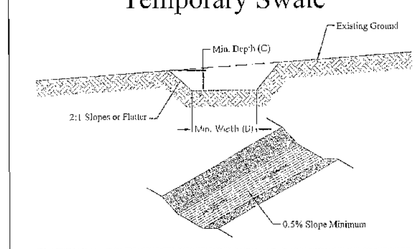
Conditions where the Practice Applies

A cutback curb is installed when discharge from the lot must over the curb.

Design Criteria

1. Cut back soil from behind curb 3 - 4" deep to form a temporary sediment trap.
2. Installing the sidewalk will form a two stage sediment trap that will be more effective.

Temporary Swale



Definition

A temporary swale is a temporary, excavated drainage way constructed and located to convey runoff to a desired location.

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

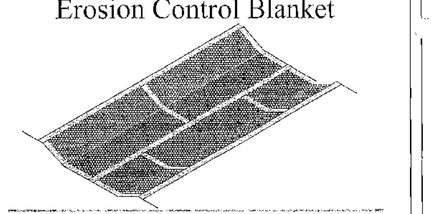
Temporary swales are constructed:

1. To divert sediment laden runoff from a disturbed area to a sediment trapping device.
2. Across disturbed areas to shorten overland flow distances.
3. To divert sediment laden water along the face of slopes to a trapping device.
4. To divert clean water from an undisturbed area to a stabilized outlet. Runoff shall be discharged at non-erosive velocities.

Design Criteria

The basis for engineering design shall be the 2-year, 24-hour duration storm using N.R.C.S. criteria, assuming the worst soil cover conditions to prevail in the contributing drainage area over the life of the earth dike. Manning's Equation shall be used to determine earth dike flow channel velocities associated with the developed discharge. The Manning's Roughness coefficients to be used in the equation are 0.025 for seed and mulch, 0.03 for stabilization matting or sod, and 0.05 for flow depths up to 1' (Dike A) and 0.038 for flow depths between 1 and 2 feet (Dike B). Allowable flow channel velocities shall be less than 4 fps for seed and mulch, less than 6 fps for stabilization matting or sod, and less than 8 fps for 4"-7" stone.

Erosion Control Blanket



Definition

Application of a protective layer of straw, other plant residues, stone, or synthetic materials to the soil surface.

Purpose

To protect the soil surface from the forces of raindrop impact and over flow. Blankets foster the growth of vegetation, reduces evaporation, insulate the soil, and suppresses weed growth. They are frequently used to assist industry planting.

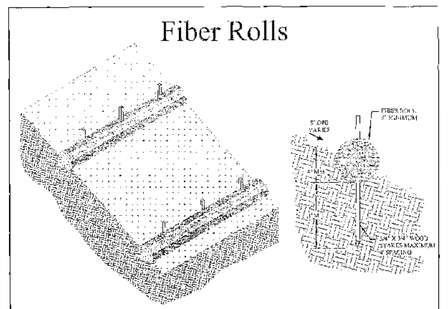
Conditions where the Practice Applies

Mulch temporary or permanent seedings immediately after planting. Mulch second plantings of trees, shrubs, or ground covers to stabilize the soil between plants. Areas that cannot be seeded because of the season should be mulched to provide temporary protection of the soil surface. Use an organic mulch in this case that can be incorporated into the soil during seedbed preparation.

Design Criteria

1. A surface mulch is the most effective, practical means of controlling runoff and erosion on disturbed land prior to vegetation establishment. Mulch reduces soil moisture loss by evaporation, prevents crusting, and sealing of the soil surface, moderates soil temperatures, provides a suitable microclimate for seed germination, and may increase the infiltration rate of the soil.
2. Organic mulches such as straw, wood chips, and shredded bark have been found to be the most effective mulch materials. Materials containing weed and grass seeds which may compete with establishing vegetation should not be used. Also, decomposition of some wood products can tie up significant amounts of soil nitrogen, making it necessary to modify fertilization rates and fertilizer with the mulch.
3. A variety of erosion control blankets have been developed in recent years for use in swales, particularly in critical areas such as waterways and channels. Various types of netting materials are also available to anchor organic mulches.
4. Chemical soil stabilizers or soil binders, when used alone, are less effective than other types of mulches. These products are primarily useful for holding wood fiber or straw in place.
5. The choice of materials for mulching should be based on soil conditions, season, type of vegetation, and size of the area. A properly applied and tacked mulch is always beneficial. It is especially important when conditions of germination are not optimum, such as midsummer and early winter, and difficult sites such as cut slopes and drought soils.

Fiber Rolls



Definition

Series of wood or fiber wood for erosion control, sediment control, and stormwater runoff control. Plastic netting or backup contain the straw or fiber.

Purpose

Fiber rolls allow water to pass through while decreasing runoff velocity, increasing infiltration rate, and trapping sediment. Also known as sediment logs or wattles, they can provide temporary or permanent controls and biodegrade with time.

Conditions where the Practice Applies

* Along the foot of a slope to reduce the slope length.
* At grade breaks where slopes transition from shallow to steep.
* In drainage swales.
* Along perimeters.
* On flat ground such as urban development projects.

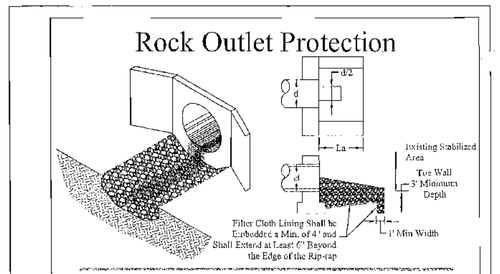
Limitations

* Applicable where surface flows do not exceed 1 cfs and on slopes of less than 20:1V
* Fiber rolls are not to be used in the base of slopes in place of linear sediment barriers such as silt fences.
* Not recommended in concentrated flow areas.

Standards and Specifications

* Fiber rolls are either prefabricated rolls or rolled fiber of erosion control blankets 8-9" in diameter.
* Remove debris and larger stones from the sloped area before installing the fiber roll.
* Place rolls slightly down slope to prevent ponding in middle.
* Must be installed in shallow trenches.

Rock Outlet Protection



Definition

Rock placed at the outfall of culverts or culverts.

Purpose

The purpose of rock outlet protection is to reduce the velocity of flow to non-erosive rates in the receiving channel.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts are sufficient to erode the receiving channel. This applies to outlets of all types such as culverts, basins, storm water management ponds, and road culverts.

Design Criteria

The design method applies to sizing each rip-rap and gabions to protect a downstream area. It does not apply to rock lining of channels or streams. Many counties and state agencies have regulations and designs procedures established for the minimum, type, and size of stone size, and locations where outlet protection is required.

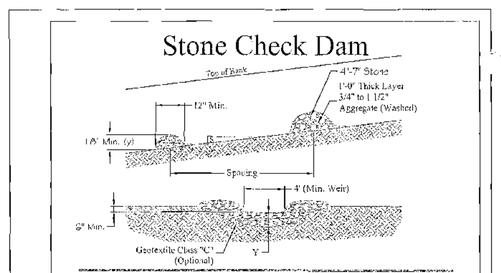
Design Procedures:

1. Investigate the downstream channel to ensure that non-erosive velocities can be maintained.
2. Determine the tailwater depth at the outlet.
3. Using the discharge velocity and depth of flow, determine the rip-rap size and apron length required.
4. Calculate apron width at the downstream end if a flared apron is to be used.

There are three classifications of rock outlet protection: (1) Discharge to semi-confined section (minimum tailwater condition), (2) Discharge to a confined channel section; (3) Discharge to a flat area with no tailwater influence.

The outlet protection may be done using rock rip-rap, or gabions. Rip-rap thickness is 19", 32", and 40" for Class I, II, and III respectively. The stone shall consist of field stone and hard quarry stone. The filter is a layer of material placed between the rip-rap and the underlying soil surface to prevent soil movement into and through the rip-rap. Rip-rap shall have a filter placed under it in all cases. A filter can be gravel or Geotextile Class "C". Gabion baskets may be substituted for rock rip-rap. Gabions shall be of single unit construction. Place Geotextile under all gabions and follow manufacturer's specifications.

Stone Check Dam



Definition

Stone check dams are stone weirs in ravines in streams and channels.

Purpose

Stone check dams are constructed to reduce runoff velocities to non-erosive rates and to prevent channel erosion in drainage courses.

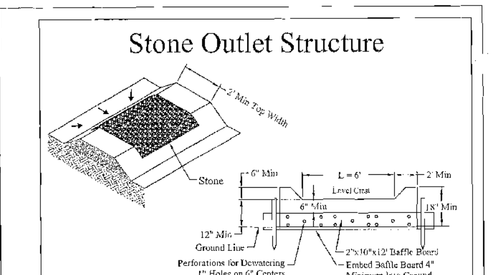
Design Criteria

1. Stone check dams shall be located so as to provide maximum velocity reduction. This may be achieved by considering the volume of runoff, the drainage area and the slope. The check dams should be placed in reasonably straight ditch sections to minimize the potential for erosion in the channel bend. All stone check dams should be keyed into the sides and bottom of the channel. This is not to be used as a sediment trapping device. Sediment laden runoff must pass through a sediment trapping device prior to being discharged from the site.
2. The distance between the stone check dams will vary with the longitudinal ditch slope. Stone check dams shall be constructed using 4"-7" stone (See Materials Specifications, Stone Size), or recycled concrete equivalent and shall be placed to form a weir. The outlet crest or top of the stone weir shall be approximately 6 feet lower than the outer edges. The weir or upstream side of the weir shall be lined with a 1' thick layer of washed (3/4" to 1 1/2") crushed aggregate Geotextile Class "E" (See Materials Specifications, Geotextiles) or better under the bottom and sides of the dam prior to placement of stone is optional.
3. The height of the stone outlet weir should not exceed 1/2 the ditch or swale. Additionally, the maximum height of the weir crest not exceed 2 feet to prevent scour of the toe of the dam. If the check dam exceeds this, these provisions do not apply and an engineering analysis should be conducted. The stone check dam should be wide enough to reach from bank to bank of the ditch or swale with the weir section length in the center of the dam.
4. The number of check dams will depend on the length and slope of the ditch or swale. The required spacing is determined as:

$$x = y/S \text{ where,}$$

x = Check dam spacing in Feet
y = Check dam height in Feet
S = Natural Channel Slope in 3:1
The spacing is most sensitive to channel slope and height of dam.

Stone Outlet Structure



Definition

A temporary stone dike installed in conjunction with mud as a part of an earth dike.

Purpose

Stone outlet structures apply to any point of discharge where there is a need to dispose of runoff in a protected outlet or to collect concentrated flow for the duration of the period of construction. The drainage area to this practice shall be 1/2 acre or less.

Outlet

The stone outlet structure shall be located so as to discharge onto an already stabilized area or into a stable watercourse. Stabilization shall consist of complete vegetative cover, paving, etc., sufficiently established to be erosion resistant.

Design Criteria

1. Refer to Material Specifications, Stone. Stone 2" to 3" diameter or recycled concrete equivalent is preferred but clean gravel may be used if stone is not available.
2. The crest of the stone dike shall be at least 6" lower than the lowest elevation of the top of the earth dike and shall be level.
3. The stone outlet structure shall be embedded into the soil a minimum of 4"
4. The minimum length of the crest of the stone outlet structure shall be 6'.
5. The baffle board shall extend 1' into the dike and 4" into the ground and be staked in place.
6. The drainage area to this structure shall be less than 1/2 acre.

Erosion Control Notes

1. All perimeter erosion and sediment control measures shall be installed prior to the execution of any grading work and maintained by the grading contractor for the duration of the grading project. Failure to install and maintain erosion control is a violation of State Law and subject to fine.
2. The appropriate erosion control devise(s) shall be installed prior to the inception of any land disturbing activity and shall be properly mainetained for construction activities.
3. All Erosion Control devices and their installation shall meet the standards prescribed in the current guidelines for storm water management for construction activities.
4. Sediment collected behind the sediment filters and silt fences shall be removed when sediment reaches one third the height of the barrier.
5. Sediment filters and silt fences shall be inspected and maintained no less than weekly or within 24 hrs. of a rainfall event of 0.5 inches or more. Maintenance shall include but not limited to sediment removal, barrier repair and / or replacement.
6. Construction Site Entrance: The contractor shall construct as a minimum one stabilized construction entrance at the location shown on the plans. If additional ingress and egress to the construction site is required, the contractor shall coordinate with the construction manager the location of these additional stabilized construction entrances. Usage of non-stabilized for ingress and egress will not be permitted. The stabilized entrances shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way and paved driving lanes. This may require periodic top dressing with additional stone as conditions warrant. Repair of the entrances or cleaning of the right-of-way and paved driving lanes that haave been soiled shall be performed by the contractor at his own expense, satisfactory to the construction manager. When necessary, vehicle wheels and tires shall be cleaned to remove sediment prior to entering onto public rights-of-way and public streets. When washing is required, it shall be done on an area stabilized with crushed stone.
7. The contractor, shall at his own expense, periodically water the site to control dust.
8. Sedimentation and erosion control measures shall be removed following construction or upon permanent stabilization of the disturbed and graded areas, whichever occurs last.
9. All disturbed areas that are not to be paved shall be re-seeded unless noted otherwise.
10. The Contractor shall keep the site clean at all times and control dust resulting from the earthwork operations. The Contractor shall not track mud onto the public streets.

Engineer Stamp

Inspections Plus Inc.
Erosion Control Plan

Standard Details

Project:_____

Date:_____

_____

Sheet No. _____