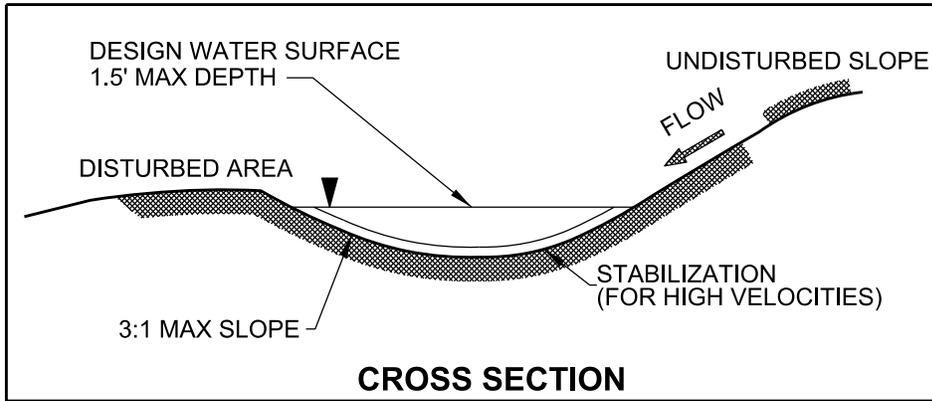


INTERCEPTOR SWALE



DESCRIPTION

An interceptor swale is a small v-shaped, trapezoidal, or parabolic channel that collects runoff and directs it to a desired location. It can either have a natural grass lining or, depending on slope and design velocity, a protective lining of erosion control matting, crushed stone or concrete.

PRIMARY USE

The interceptor swale can either be used to direct sediment-laden flow from disturbed areas into a controlled outlet or to direct 'clean' runoff around disturbed areas. Since the swale is easy to install during early grading operations, it can serve as the first line of defense in reducing runoff across disturbed areas. As a method of reducing runoff across the disturbed construction area, it reduces the requirements of structural measures to capture sediment from runoff since the flow is reduced. By intercepting sediment laden flow downstream of the disturbed area, runoff can be directed into a sediment basin or other BMP for sedimentation as opposed to long runs of silt fence or other filtration method.

Base on site topography, swales can be effectively used in combination with diversion dikes.

APPLICATIONS

Common applications for interceptor swales include roadway projects, site development projects with substantial offsite flow impacting the site and sites with a large area(s) of disturbance. It can be used in conjunction with diversion dikes to intercept flows. Temporary swales can be used throughout the project to direct flows away from staging, storage and fueling areas along with specific areas of construction. Note that runoff which crosses disturbed areas or is directed into unstabilized swales must be routed into a treatment BMP such as a sediment basin.

Grass lined swales are an effective permanent stabilization technique. The grass effectively filters both sediment and other pollutants while reducing velocity.

DESIGN CRITERIA

- Maximum depth of flow in the swale shall be 1.5 feet based on a 2-year return period design storm peak flow. Positive overflow must be provided to accommodate larger storms.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=1.00

E-1

1/3

Scale : N/A Date : 02/21/05

Design : COG

Drawn : COG

Dwg. File : ERO_001.DWG

Project No. : STANDARD-DETAILS


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INTERCEPTOR SWALE

PAGE

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INTERCEPTOR SWALE

- The maximum contributing drainage area should be 5 acres or less depending on site conditions.
- Channels may be trapezoidal, parabolic, or v-shaped; however v-shaped channels may be difficult to stabilize, so they are generally used only where the volume and rate of flow is low.
- Side slopes of the swale shall be 3:1 or flatter.
- Minimum design channel freeboard shall be 6 inches.
- For grades less than 2 percent and velocities less than 6 feet per second, the minimum required channel stabilization shall be grass, erosion control mats or mulching. For grades in excess of 2 percent or velocities exceeding 6 feet per second, stabilization is required in the form of turf reinforcement mats (or a layer of crushed stone or rip-rap with appropriate size, gradation, and thickness depending on flow conditions). Velocities greater than 8 feet per second will require approval by the local jurisdiction and is discouraged.
- Check dams can be used to reduce velocities in steep swales. See BMP S-7, Check Dam, for design criteria.
- Interceptor swales must be designed for flow capacity based on Manning's Equation to ensure a proper channel section. Alternate channel sections may be used when properly designed and accepted.
- Consideration must be given to the possible impact that any swale may have on upstream or downstream conditions.
- Swales must maintain a negative grade to a controlled outlet.
- Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment-trapping device.

LIMITATIONS

Interceptor swales must be stabilized quickly upon excavation so as not to contribute to the erosion problem they are addressing.

Swales may be unsuitable to the site conditions (too flat or steep).

For permanent swales, the 1.5 feet maximum depth can be increased as long as provisions for public safety are implemented.

MAINTENANCE REQUIREMENTS

Swales should be inspected regularly (at least as often as required by the TPDES Construction General Permit) to locate and repair any damage to the channel or to clear debris or other obstructions so as not to diminish flow capacity. Damage from storms or normal construction activities such as tire ruts or disturbance of swale stabilization shall be repaired as soon as practical.

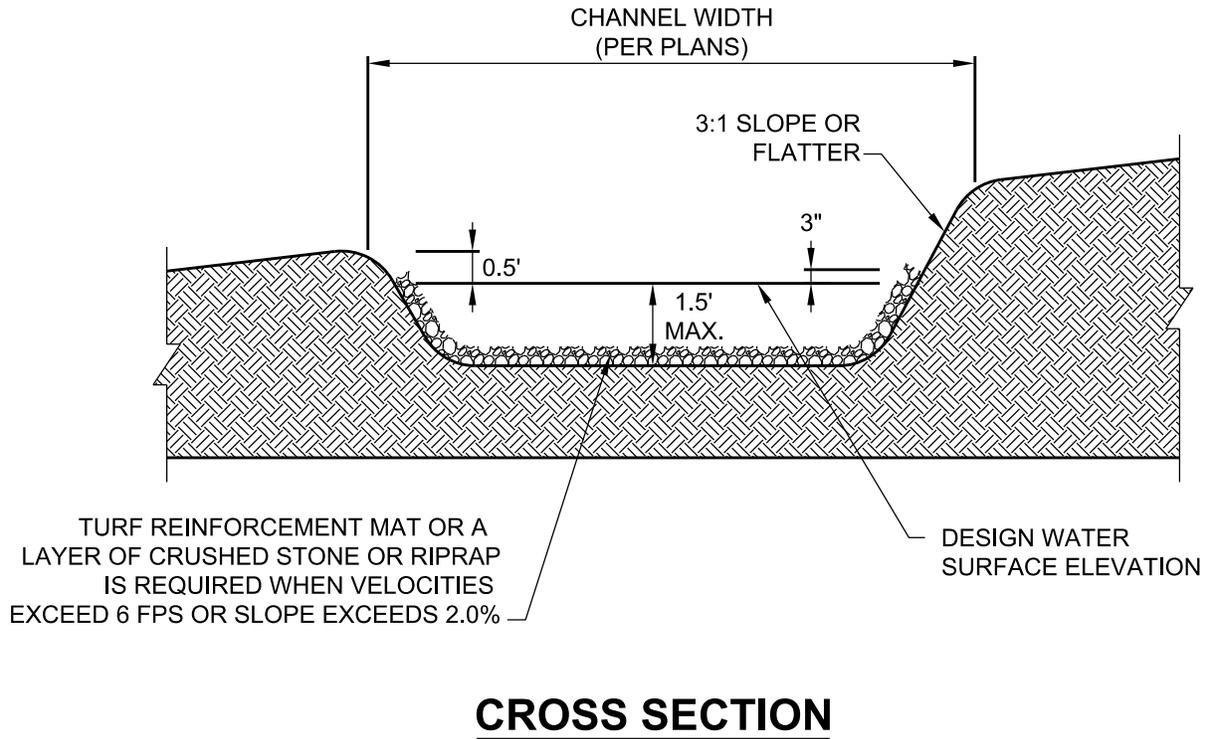
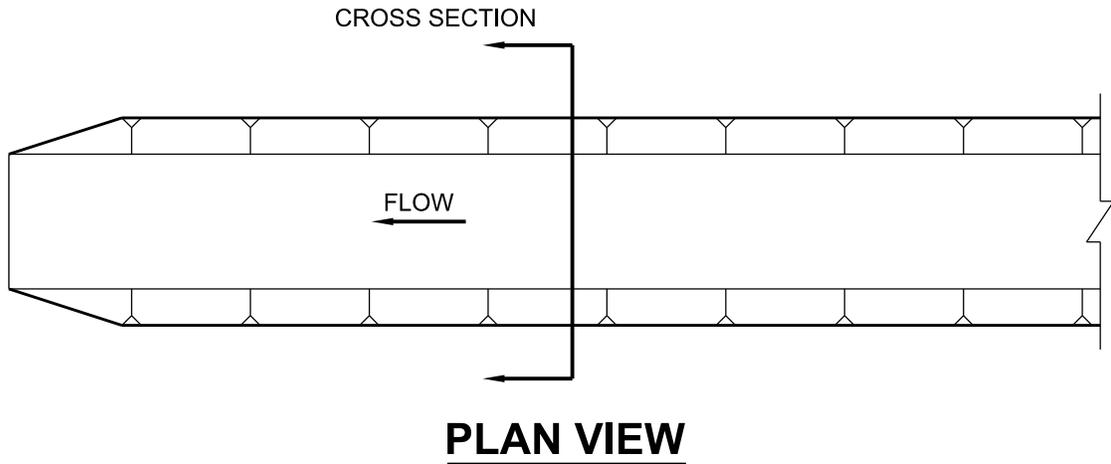
SPECIFICATIONS

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.6 Interceptor Swale.

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INTERCEPTOR SWALE



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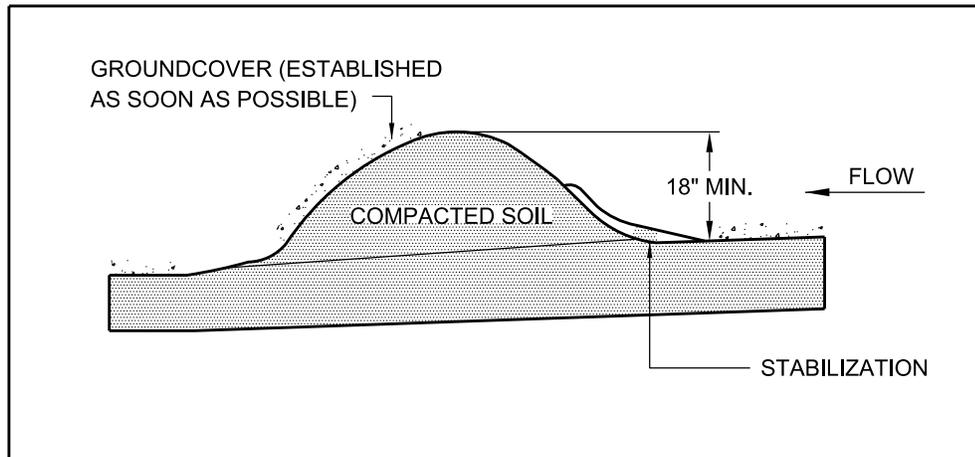
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INTERCEPTOR SWALE

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DIVERSION DIKE



DESCRIPTION

A diversion dike is a compacted soil mound, which redirects runoff to a desired location. The dike is typically stabilized with natural grass for low velocities or with stone or erosion control mats for higher velocities.

PRIMARY USE

The diversion dike is normally used to intercept offsite flow upstream of the construction area and direct the flow around the disturbed soils. It can also be used downstream of the construction area to direct flow into a sediment reduction device such as a sediment basin or protected inlet. The diversion dike serves the same purpose as an interceptor swale and, based on the topography of the site, can be used in combination with an interceptor swale.

APPLICATIONS

By intercepting runoff before it has the chance to cause erosion, diversion dikes are very effective in reducing erosion at a reasonable cost. They are applicable to a large variety of projects including site developments and linear projects such as roadways and pipeline construction. Diversion dikes are normally used as perimeter controls for construction sites with large amounts of offsite flow from neighboring properties. Used in combination with swales, the diversion dike can be quickly installed with a minimum of equipment and cost, using the swale excavation material to construct the dike. No sediment removal technique is required if the dike is properly stabilized and the runoff is intercepted prior to crossing disturbed areas.

Significant savings in structural controls can be realized by using diversion dikes to direct sheet flow to a central area such as a sediment basin or other sediment reduction structure if the runoff crosses disturbed areas

DESIGN CRITERIA

- The maximum contributing drainage area should be 5 acres or less depending on site conditions.
- Maximum depth of flow at the dike shall be 1 foot based on a 2-year return period design storm peak flow.
- Side slopes of the diversion dike shall be 3:1 or flatter.
- Minimum width of the embankment at the top shall be 2 feet.
- Minimum embankment height shall be 18 inches as measured from the toe of slope on the upgrade side of the berm.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=1.00

E-2

1/3

Scale : N/A Date : 02/21/05

Design : COG

Drawn : COG

Dwg. File : ERO_002.DWG

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DIVERSION DIKE

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DIVERSION DIKE

- For grades less than 2 percent and velocities less than 6 feet per second, the minimum required channel stabilization shall be grass, erosion control mats or mulching. For grades in excess of 2 percent or velocities exceeding 6 feet per second, stabilization is required in the form of turf reinforcement mats (or a layer of crushed stone or rip-rap with appropriate size, gradation, and thickness depending on flow conditions). Velocities greater than 8 feet per second will require approval by the local jurisdiction and is discouraged.
- The dikes shall remain in place until all disturbed areas, which are protected by the dike are permanently stabilized unless other controls are put into place to protect the disturbed area.
- The flow line at the dike shall have a positive grade to drain to a controlled outlet.
- Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment-trapping device.
- Soil used in construction of the dike can be on-site material. It should be free of rocks larger than three inches in diameter and should be clay, silty clay or sandy clay with a plasticity index greater than 25. If only low PI material is available, it will be necessary to armor the slopes with stone or geotextile to prevent erosion of the dike.

LIMITATIONS

Compacted earth dikes require stabilization immediately upon placement so as not to contribute to the problem they are addressing.

The diversion dikes can be a hindrance to construction equipment moving on the site; therefore their locations must be carefully planned prior to installation.

MAINTENANCE REQUIREMENTS

Dikes should be inspected regularly (at least as often as required by the TPDES Construction General Permit) to determine if silt is building up behind the dike, or if erosion is occurring on the face of the dike. Silt shall be removed in a timely manner. If erosion is occurring on the face of the dike, the face of the slopes shall either be stabilized through mulch or seeding or the slopes shall be flattened.

SPECIFICATIONS

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.7 Diversion Dike.

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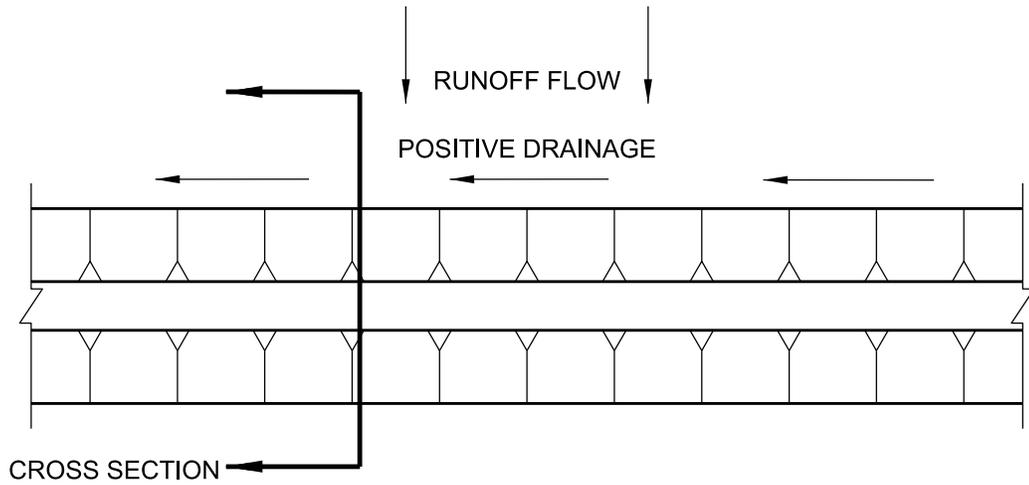
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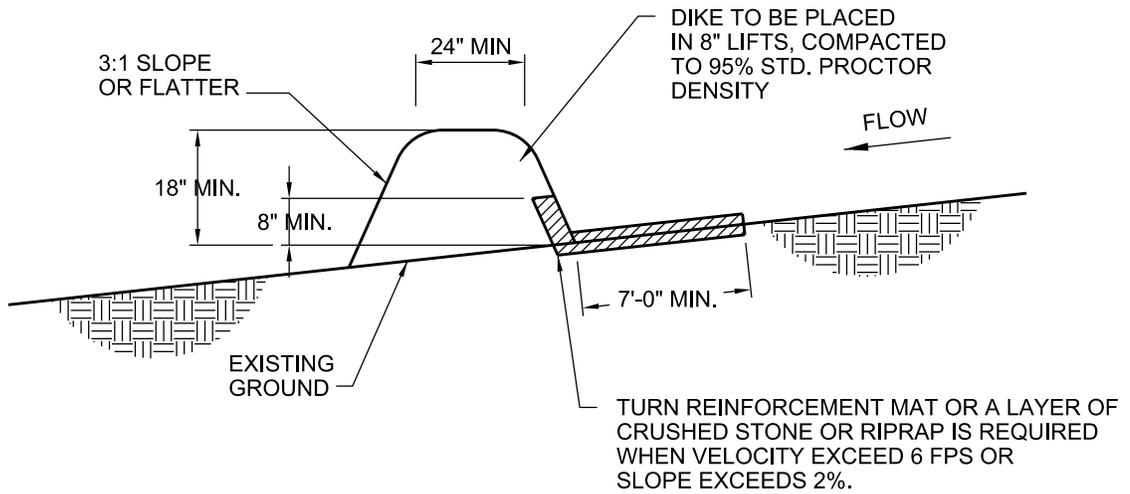
DIVERSION DIKE

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DIVERSION DIKE



PLAN VIEW



CROSS SECTION

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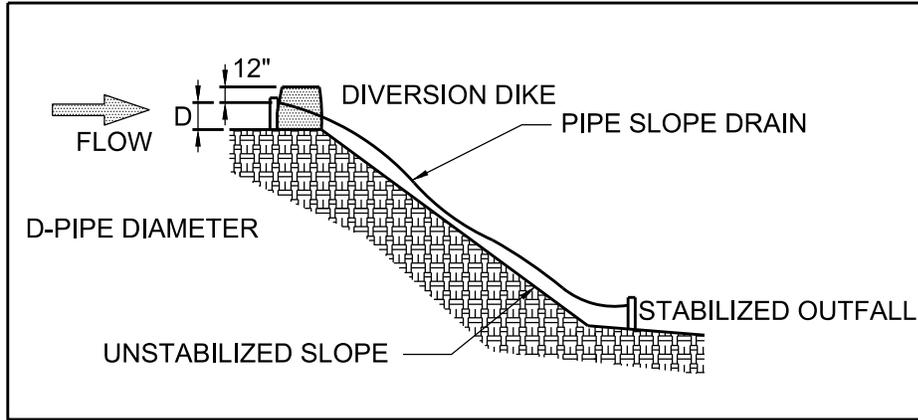
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DIVERSION DIKE

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PIPE SLOPE DRAIN



DESCRIPTION

A pipe slope drain is a temporary (or permanent) pipeline typically utilizing flexible pipe that conveys runoff down unstabilized slopes. The drain is anchored on the upstream end with some form of headwall to limit erosion and secure the pipe.

PRIMARY USE

Pipe slope drains are used to protect preliminary and final graded slopes during establishment of temporary and permanent ground covers. They are used on sites with a long, unstabilized, steep slope area that is subject to erosion from overland flow. They are normally used in combination with interceptor swales or diversion dikes to direct the flow into the pipe area. The pipe slope drain can provide service for a relatively large area. It does not treat the runoff, therefore if the runoff contains sediment, treatment through a controlled outlet will be required before the flow is released offsite.

APPLICATIONS

Sites with large berms or grade changes such as roadway embankments are candidates for a pipe slope drain. Since provisions must be made to direct the flow into the pipe drain, some grading is normally required upstream of the pipe slope drain. Installed properly, slope erosion can be greatly reduced (but not entirely eliminated) through the use of the drain.

Pipe slope drains also require a stabilized outlet. This is critical since the velocities at the outfall are normally high. Velocity dissipators such as stone or concrete rip-rap are typically required to reduce the velocity and spread the flow, reducing erosion. Flow from a pipe slope drain should be routed to a sediment reduction practice (BMP with S prefix) through interceptor swales, diversion dikes or other suitable methods.

DESIGN CRITERIA

- The entrance to the pipe slope drain may be a standard corrugated metal pre-fabricated flared end section with an integral toe plate extending a minimum of 6 inches from the bottom of the end section.
- The grade of the entrance shall be 3 percent maximum.
- The berm at the entrance shall have a minimum height of the pipe diameter + 12" and a minimum width of 3 times the pipe diameter.
- All sections of the pipe slope drain shall be connected using watertight collars or gasketed watertight fittings.

Applications

- Perimeter Control
- Slope Protection
- Sediment Trapping
- Channel Protection
- Temporary Stabilization
- Permanent Stabilization
- Waste Management
- Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

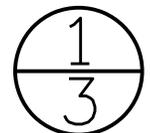
- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Varies

E-3



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PIPE SLOPE DRAIN

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PIPE SLOPE DRAIN

- All sediment-laden runoff conveyed by the pipe slope drain shall be directed to a sediment trapping facility.
- The pipe shall be secured with hold down anchors spaced 10 feet on center.
- Temporary pipe slope drains are to be sized to accommodate runoff flows equivalent to a 10-year storm as calculated using the Rational Method and Manning's equation, but in no case shall pipes be sized smaller than shown on the following table:

Minimum Pipe Size	Maximum Contributing Drainage Area
12"	0.5 Acres
18"	1.5 Acres
21"	2.5 Acres
24"	3.5 Acres
30"	5.0 Acres

- Maximum drainage areas for individual pipe slope drains shall be 5 acres. For areas larger than 5 acres, additional drains shall be added.
- Both the entrance and outfall of the pipe slope drain should be properly stabilized. Grass can normally be used at the entrance, but armor type stabilization such as stone or concrete riprap is normally required to address the high velocities of the outfall.
- A riprap lined apron shall be excavated to accept the discharge from the pipe and dissipate the energy of the flow. The width of the bottom of the apron shall be 3 times the pipe diameter, and the length shall be a minimum of 6 times the pipe diameter of the drain pipe. The apron shall be a minimum of 12 inches in depth and shall be lined with riprap weighing between 50 and 150 pounds per stone at a thickness of 12 inches minimum. The apron shall be designed so that the released flow has a velocity less than 3 feet per second.

LIMITATIONS

- Drains must be located away from construction areas since the drain can easily be damaged by construction traffic.
- Grading is normally required upstream of the pipe slope drain in order to direct flow into the system. This can cause additional cost and maintenance. Securing the pipe to the slope can be difficult and require significant maintenance during the life of the system.
- In situations where pipe slope drains convey sediment-laden runoff, pipes can become clogged during large rain events causing water to overtop the diversion dike thereby creating a serious erosion condition.
- A pipe slope drain reduces erosion but does not prevent it or reduce the amount of sediment in runoff. Additional measures should be used in conjunction with the pipe slope drain to treat the flow.

MAINTENANCE REQUIREMENTS

Pipe slope drains should be inspected regularly (at least as often as required by the TPDES Construction General Permit) to locate and repair any damage to joints or clogging of the pipe. In cases where the diversion dike has deteriorated around the entrance of the pipe, it may be necessary to reinforce the dike with sandbags or to install a concrete collar to prevent failure. Signs of erosion around the pipe drain should be addressed in a timely manner by stabilizing the area with erosion control mats, crushed stone, concrete, or other acceptable methods.

SPECIFICATION

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.14 Pipe Slope Drain.

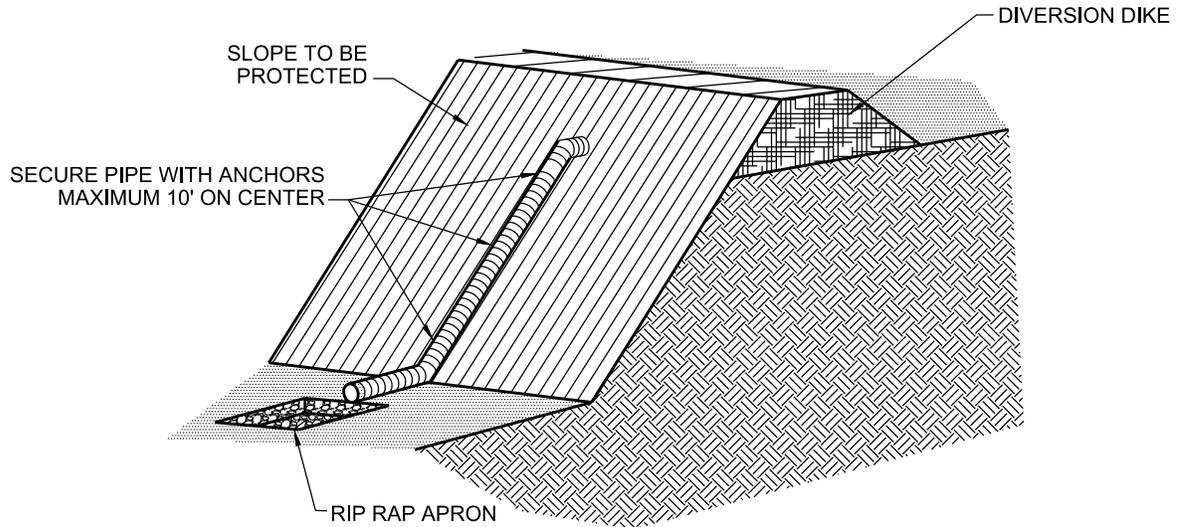
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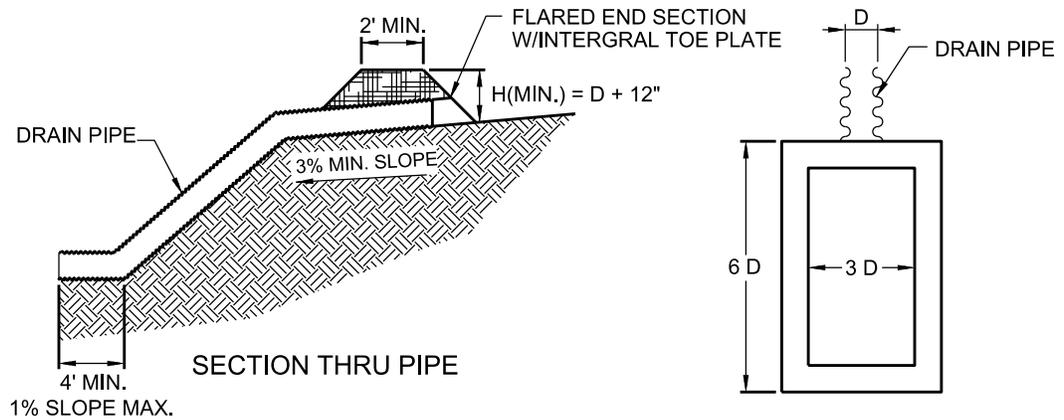


PIPE SLOPE DRAIN

PIPE SLOPE DRAIN

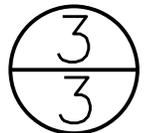


ISOMETRIC PLAN VIEW



Riprap Apron Plan View

RIPRAP SHALL CONSIST OF 50 TO 150 POUND STONES PLACED IN A LAYER OF NOT LESS THAN 12 INCHES. THE DEPTH OF THE APRON SHALL EQUAL THE PIPE DIAMETER BUT IN NO CASE SHALL IT LESS THAN 12".



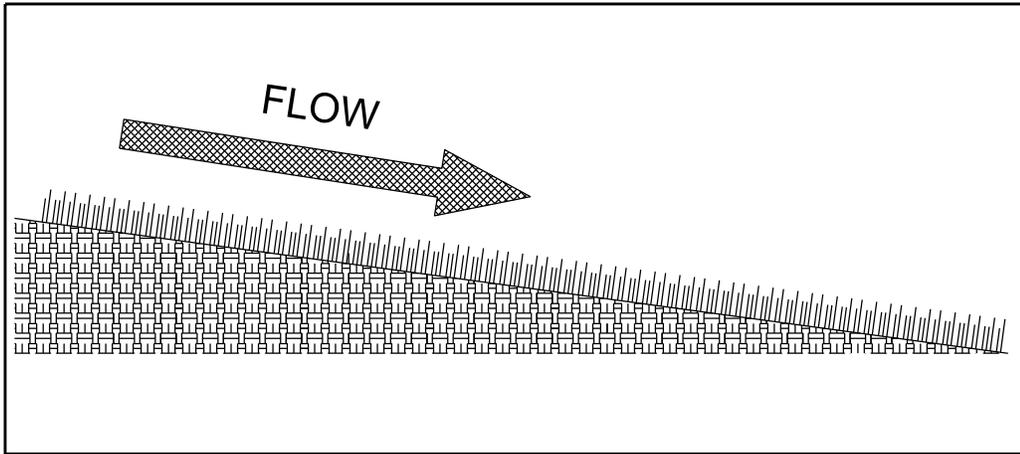
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PIPE SLOPE DRAIN

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VEGETATION



DESCRIPTION

Vegetation, as a Best Management Practice, is the sowing or sodding of annual grasses, small grains, or legumes to provide interim and permanent vegetative stabilization for disturbed areas.

PRIMARY USE

Vegetation is used as a temporary or permanent stabilization technique for areas disturbed by construction. As a temporary control, vegetation is used to stabilize stockpiles and barren areas that are inactive for long periods of time. As a permanent control, grasses and other vegetation provide good protection from erosion along with some filtering for overland runoff. Subjected to acceptable runoff velocities, vegetation can provide a positive method of permanent storm water management as well as a visual amenity to the site.

Other BMPs may be required to assist during the establishment of vegetation. These other techniques include erosion control matting, swales, and dikes to direct flow around newly seeded areas and proper grading to limit runoff velocities during construction.

APPLICATIONS

Vegetation effectively reduces erosion in swales, stockpiles, berms, mild to medium slopes, and along roadways. Vegetative strips can provide some protection when used as a perimeter control for utility and site development construction.

In many cases, the initial cost of temporary seeding may be high compared to tarps or covers for stockpiles or other barren areas subject to erosion. This initial cost should be weighed with the amount of time the area is to remain inactive, since maintenance cost for vegetated areas is much less than most structural controls.

DESIGN CRITERIA

Surface Preparation

- Interim or final grading must be completed prior to seeding or sodding.
- Install all necessary erosion structures such as dikes, swales, diversions, etc. prior to seeding or sodding.
- When establishing vegetation from seed, groove or furrow slopes steeper than 3:1 on the contour line before seeding.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.90

E-4



Scale : N/A Date : 02/21/05
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VEGETATION

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VEGETATION

- Provide 4-6 inches of topsoil over rock, gravel or otherwise unsuitable soils. Poor quality topsoil should be amended with compost before applying seed or sod. Amendment should be three parts of topsoil to one part compost by volume thoroughly blended.
- Seed bed should be well pulverized, loose and uniform.

Plant Selection, Fertilization and seeding

- Use only high quality, USDA certified seed.
- Use an appropriate species or species mixture adapted to local climate, soil conditions and season as shown below, or consult with the local office of the Natural Resource Conservation Service (NRCS) or Engineering Extension service as necessary for selection of proper species and application technique in this area.
- Seeding rate should be in accordance with the table below or as recommended by the NRCS or Engineering Extension service.
- Fertilizer shall be applied according to the manufacturer's recommendation with proper spreader equipment. Typical application rate for 10-10-10 grade fertilizer is 10 lbs. per 1,000 ft²
- If hydro-seeding is used, do not mix seed and fertilizer more than 30 minutes before application.
- Evenly apply seed using cyclone seeder, seed drill, cultipacker, terraseeding, or hydroseeder.
- Provide adequate water to aid in establishment of vegetation.
- Use appropriate mulching techniques where necessary, especially during cold periods of the year.

Sodding

- Sod shall be St. Augustine grass, common bermudagrass, buffalograss, an approved hybrid of common Bermudagrass or an approved zoysiagrass.
- The sod should be mowed prior to sod cutting so that the height of the grass shall not exceed 2-inches and should not be harvested or planted when its moisture condition is so excessively wet or dry that its survival shall be affected.
- Sod shall be planted within 3-days after it is excavated.
- In areas subject to direct sunlight, pre-moisten prepared sod bed by watering immediately prior to placing sod.
- Sodded areas shall be thoroughly watered immediately after they are planted.

ADDITIONAL GUIDANCE

- Establishing a good vegetative cover is dependent of the season of the year. Projects that commence in the fall of the year may not be candidates for vegetation used as a BMP.
- Where vegetation is used in swales and channels it may be necessary to use sod, rather than seeding, to establish an erosion resistant surface to accommodate rainfall runoff flows.
- Where vegetation is used for perimeter control, the use of sod is necessary for a fifteen-foot width.
- Mulch should be used to enhance vegetative growth, in that mulch protects seeds from heat, prevents soil moisture loss, and provides erosion protection until the vegetation is established.
- Fertilizers have both beneficial and adverse effects. Fertilizers provide nutrients to the vegetation, but also fertilizers are a source of nutrients to streams and lakes. In this latter regard they are a pollutant. The use of native vegetation rather than exotics reduces the need of fertilizer. Organic fertilizers are generally preferred over chemical fertilizers from the standpoint of environmental conditions.
- Steep slopes represent a problem for establishing vegetation. Bonded Fiber Matrix or Mechanically Bonded Fiber Matrix products applied with a tackifier are useful for establishing vegetation on slopes.

TEMPORARY VEGETATION

The table on the following page lists recommended plant species for the North Central Texas region depending on the season for planting.

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VEGETATION

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VEGETATION

RECOMMENDED GRASS MIXTURE FOR TEMPORARY EROSION CONTROL:

SEASON	COMMON NAME	RATE (LBS/ACRE)
Aug 15 - Nov 30	Tall Fescue	4.0
	Western Wheat Grass	5.0
	Wheat (Red, Winter)	30.0
May 1 - Aug 31	Foxtail Millet	30.0
Feb 15 - May 31 Sep 1 - Dec 31	Annual Rye	20.0

PERMANENT VEGETATION

Grass seed for permanent vegetation can be sown at the same time as seeding for temporary (annual) vegetation. Drought tolerant native vegetation is recommended rather than exotics as a long-term water conservation measure. Native grasses can be planted as seed or placed as sod. Buffaloe 609, for example is a hybrid grass that is placed as sod. Fertilizers are not normally used to establish native grasses, but mulching is effective in retaining soil moisture for the native plants.

RECOMMENDED NATIVE GRASSES FOR PERMANENT EROSION CONTROL

GRASS		RATE
Buffaloe Grass	Full Turf Application	3-4 lbs/1000 sqft
Blue Grama	Full Turf Application	2 lbs/1000 sqft
Side Oats Grama	Applied with other native seed	¼ lb/1000 sqft

LIMITATIONS

Vegetation is not appropriate for areas subjected to heavy pedestrian or vehicular traffic. As a temporary technique, vegetation may be costly when compared to other techniques. Vegetation may require a period of days to weeks before becoming established. Lack of water and lack of or improper use of soil amendments (compost, fertilizer, etc.) will usually result in poor turf establishment. Alternate erosion control (e.g. mulching, sodding vegetative strips, etc) should be used until vegetation can be established.

Vegetation is not appropriate for rock, gravel or coarse-grained soils unless 4 to 6 inches of topsoil is applied.

MAINTENANCE REQUIREMENTS

Protect newly seeded areas from excessive runoff and traffic until vegetation is established. A watering and fertilizing schedule will be required as part of the SWPPP to assist in the establishment of the vegetation. Vegetation should be inspected regularly (at least as often as required by the TPDES Construction General Permit) to ensure that the plant material is established properly and remains healthy. Bare spots shall be reseeded and/or protected from erosion by mulch or other BMP. Accumulated sediment deposited by runoff should be removed to prevent smothering of the vegetation. In addition, determine the source of excess sediment and implement appropriate BMPs to control the erosion.



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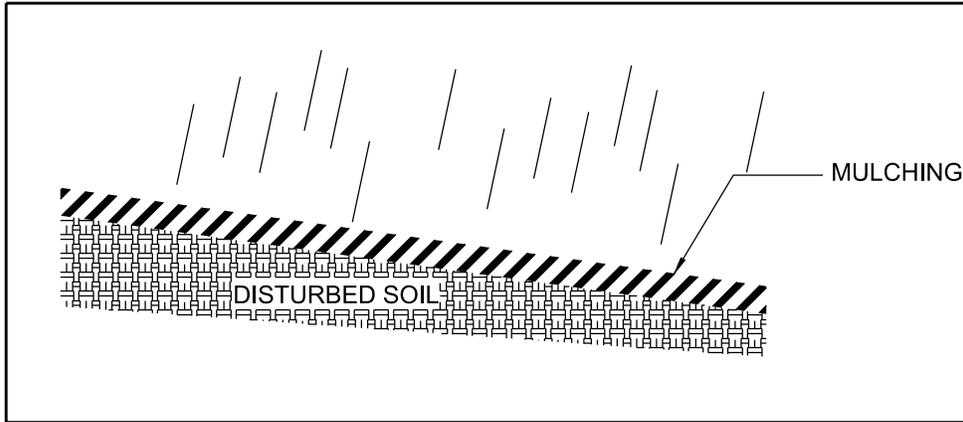


VEGETATION

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MULCHING



DESCRIPTION

Mulching is the application of a layer of chopped straw, hay, chipped site vegetation, or other material, which is spread uniformly over barren areas to reduce the effects of erosion from rainfall. Types of mulch include organic materials (e.g. compost mixtures), straw, wood chips, bark, or other fibers. Another form of mulch, which has been commercialized, uses straw or other material with organic and inorganic binding systems which are typically sprayed over the control area. Some of these products may be very effective on steeper slopes where there is no vehicular or foot traffic to disrupt the application until vegetation is established. Mulch should not contain chipped manufactured boards or chemically treated wood such as particleboard, railroad ties or similar treated wood. Hay should not be used as a replacement for straw unless it can be determined that it is weed and seed free.

PRIMARY USE

Mulch is used to temporarily and/or permanently stabilize bare or freshly seeded areas. It protects the soil from erosion and moisture loss by lessening the effects of wind, water, and sunlight. It also decreases the velocity of sheet flow, thereby reducing the volume of sediment-laden water flow leaving the mulched area.

APPLICATIONS

Mulch may be used on most construction-related disturbed area for surface protection including:

- Freshly seeded or planted areas,
- Areas at risk due to the time period being unsuitable for growing vegetation,
- Areas that are not conducive to seeding or planting.
- Steep slopes (e.g. >3H:1V), provided the mulch is anchored to the soil by use of a combination of tackifiers and netting, or crimping.

DESIGN CRITERIA

Mulch may be used by itself or in combination with netting or other anchors to promote soil stabilization.

- Choice of mulch depends largely on slope, climate, and soil type in addition to availability of materials.
- Mulch should be applied in an even and uniform manner where concentrated water flow is negligible.
- The application of straw mulch should be approximately 2 tons dry straw per acre spread uniformly across the area. Other forms of mulch, such as wood chips or chopped site vegetation, should be placed in thicknesses of two-inches or greater over the area.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.90

E-5

1/3

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MULCHING

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MULCHING

- Straw mulch should be anchored by application of a fiber mulch binder, by the application of a synthetic liquid mulch binder, by using a tractor-drawn crimper to punch into the soil, or by placing a netting above the mulch stapled to the ground, as required.
- Mulch hydraulically applied with tackifiers and binding agents is commercially available as a bonded fiber matrix (BFM) which may be particularly effective on slopes steeper than 2.5:1.
- Wood chips are suitable for areas that will not require mowing frequently and are heavy enough that they do not require anchoring. They do, however, deplete nitrogen from the soil, which is a necessary nutrient for all plants. To alleviate this condition, wood chips must be treated with 12 pounds of ammonium nitrate per ton of mulch used.
- Bark chips are popular for ornamental applications, as they do not require anchoring, do not decompose very rapidly, and serve as an excellent insulation material. When using bark chips, it is not necessary to treat for nitrogen deficiency or to fertilize.
- Compost and wood mulch mixtures should be a blend of 50% untreated wood mulch with 50% compost measured by volume. Wood mulch should be less than or equal to 5 in. in length with 95% passing a 2-in. screen and less than 30% passing a 1-in. screen. The compost shall meet the Physical Requirements specified in Table 1 of TxDOT Special Specification 1058, Compost, which can be found in Appendix F.
- Prior to the placement of any mulch, the area to be protected must be graded in accordance with plans.
- Fertilization and soil treatment should then be done prior to placement of mulch with the exceptions of when seed is to be applied by means of hydro-seed or when seed is distributed following straw mulch spreading during winter months.
- Organic mulches may be distributed by hand or by mechanical means, but to be effective a complete covering is required.
- Refer to the table on the following page for additional guidance.

LIMITATIONS

Mulches are subject to removal by wind or water under severe climatic conditions.

Mulches lower the soil temperature, which may result in longer seed germination periods.

Mulch should not be applied within the ordinary high-water mark of surface waters, as it can be a potential floatation material.

MAINTENANCE REQUIRMENTS

Mulched areas should be inspected regularly (at least as often as required by the TPDES Construction General Permit, Appendix A) for thin or bare spots caused by natural decomposition or weather related events. Mulch in high traffic areas should be replaced on a regular basis to maintain uniform protection. Excess mulch should be brought to the site and stockpiled for use during the maintenance period to dress problem spots.

SPECIFICATION

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.17 Mulching.

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MULCHING

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MULCHING

Mulch Standards and Guidelines			
Mulch Material	Quality Standards	Application Rates	Remarks
Straw	Air-dried, free from undesirable seed and from coarse material.	2"-3" thick, Approx 2 tons per acre.	Cost-effective when applied with adequate thickness. Hay can be used if weed and seed free. In windy areas and on steep slopes, straw must be held in place by crimping, using a tackifier, or covering with netting.
Chipped Site Vegetation	Should include gradation from fine to coarse to promote interlocking properties. Maximum size 6 inches in length.	2" minimum thickness over area; approx. 10 tons per acre.	Cost-effective manner of disposing of vegetative debris from site. Do not place in areas subject to flooding. Decomposition of chipped vegetation competes with nutrients important to subsequent grass establishment. Mulch must be free of waste materials such as plastic bag, metal debris, etc.
Wood Mulch and Compost Mixture	Compost shall meet the Physical Requirements	2" minimum thickness over area; approx. 10 tons per acre.	Special caution is advised regarding the source and composition of wood mulches. Determine whether the preparation include weed seed control. Wood mulches are an excellent soil amendment, ultimately improving the organic content of the soil.
Hydromulch	No growth inhibiting factors.	Approx 25-30 lbs per 1000 sf or 1500-2000 lbs per acre.	Apply with a hydromulcher. Fibers should be kept to less than 3/4 inch to prevent clogging equipment. Best used in conjunction with seed at time of application.
Bonded Fiber Matrix	Hydraulically applied mulch with tackifiers and binding agents.	Follow the manufacturer's recommendations. (typically 3000 lbs per acre or greater).	Bonded fiber matrix may be particularly effective on slopes steeper than 2.5:1.

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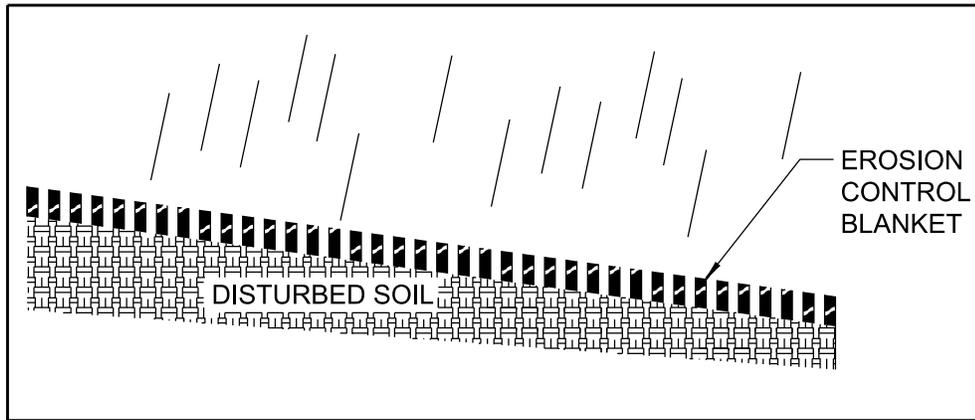

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MULCHING

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EROSION CONTROL BLANKETS



DESCRIPTION

An erosion control blanket (ECB) is a temporary degradable erosion prevention product placed over disturbed areas to limit the effects of erosion due to rainfall impact and runoff across barren soil. Erosion control blankets are manufactured by a wide variety of vendors addressing a wide variety of conditions such as slope and functional longevity. Blankets are typically constructed of natural materials such as coir (coconut husk) fibers, excelsior (wood) or straw covered on both sides by degradable synthetic netting.

PRIMARY USE

Erosion control blankets are designed to hold seed and soil in place until vegetation is established on disturbed areas. They can be used on any disturbed areas, but are particularly effective for slopes and embankments. When used in combination with sediment trapping BMPs such as silt fence or wattles, blankets may be used as a perimeter control with or without vegetation.

DESIGN CRITERIA

- The type and class of erosion control mat must be specified as appropriate for the slope of the area to be protected and the anticipated length of service.
- ECBs should meet the applicable "Minimum Performance Standards for TxDOT" as published by TxDOT in its "Erosion Control Report" and/or be listed on the most current annual "Approved Products List for TxDOT" applicable to TxDOT Item 169 Soil Retention Blanket and its Special Provisions.
- Prior to the installation of any erosion control matting, all rocks, dirt clods, stumps, roots, trash and any other obstructions that would prevent the mat from lying in direct contact with the soil shall be removed. Anchor trenching shall be located along the entire perimeter of the installation area, except for small areas with less than 2% slope.
- Installation and anchoring shall conform to the recommendations shown within the manufacturer's published literature for the approved erosion control blanket. Particular attention must be paid to joints and overlapping material.
- After appropriate installation, the blankets should be checked for uniform contact with the soil; security of the lap joints, and flushness of the staples with the ground.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

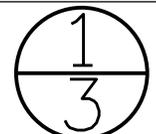
- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.90

E-6



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**EROSION CONTROL
 BLANKETS**

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EROSION CONTROL BLANKETS

LIMITATIONS

Care must be exercised in specifying the proper Erosion Control Blanket product for the intended application.

For application requiring a permanent erosion control product, or for stabilizing slopes greater than 2H:1V or lining open conveyance channels, Turf Reinforcement Mats should be utilized.

MAINTENANCE REQUIREMENTS

Erosion Control Blankets should be inspected regularly (at least as often as required by the TPDES Construction General Permit) for bare spots caused by weather related events. Missing or loosened blankets must be replaced or re-anchored. Also check for excess sediment deposited from runoff. Remove sediment and/or replace blanket as necessary. In addition, determine the source of excess sediment and implement appropriate BMPs to control the erosion.

SPECIFICATIONS

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.16 Erosion Control Blankets.



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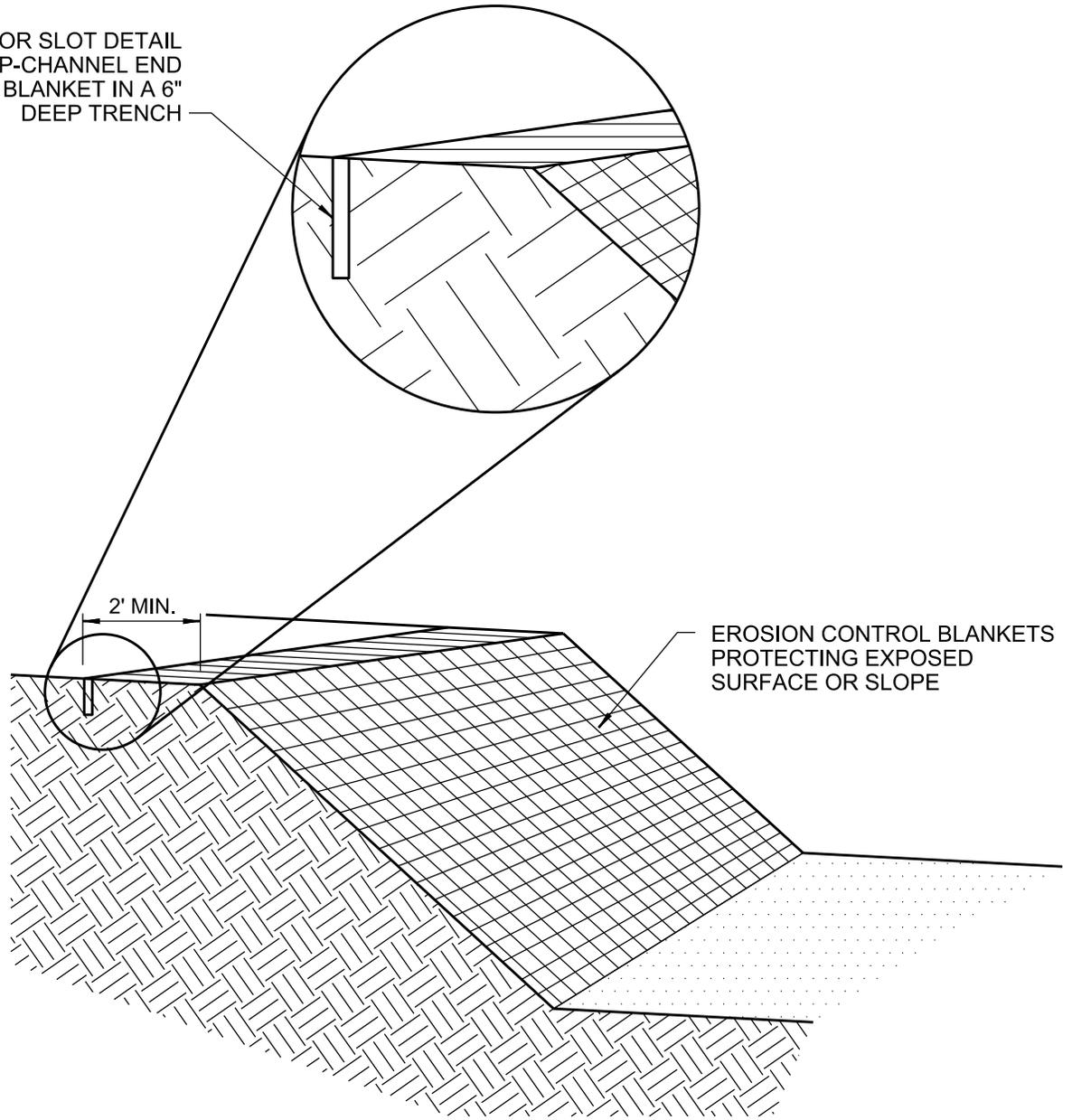


EROSION CONTROL
BLANKETS

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EROSION CONTROL BLANKETS

ANCHOR SLOT DETAIL
BURY THE UP-CHANNEL END
OF THE BLANKET IN A 6"
DEEP TRENCH



NOTE:
ANCHORING OF THE EROSION CONTROL BLANKETS SHALL BE
DONE IN ACCORDANCE WITH THE MANUFACTURE'S RECOMMENDATIONS.

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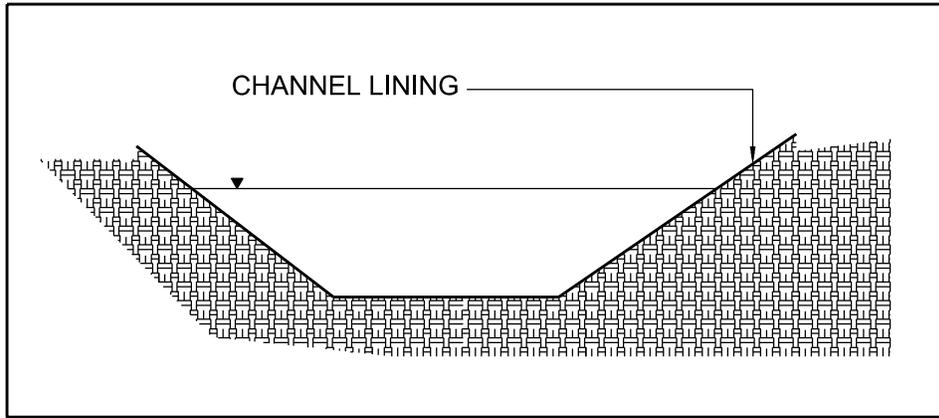
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**EROSION CONTROL
BLANKETS**

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CHANNEL PROTECTION



DESCRIPTION

Channel protection includes a variety of erosion prevention techniques including vegetation, turf reinforcement mats, and riprap. Channel protection is required to protect the sides and bottom of open channels from erosion caused by storm water flows.

PRIMARY USE

The information presented in this Fact Sheet primarily addresses protection of temporary channels constructed to convey storm water runoff on a property under development. Grass-lining should be adequate for most temporary channels, although some situations may require additional protection provided by turf reinforcement mats or riprap

There are separate requirements for design of permanent open channels in the iSWM Design Manual for Development/Redevelopment and/or local drainage manual; however, permanent channels must also be protected from erosion during the construction phase.

APPLICATIONS

Channel protection for constructed open channels conveying concentrated storm water runoff. Examples include:

- discharge from diversion dikes or interceptor swales;
- flows to and discharges from sediment traps or basins;
- roadside drainage channels;
- conveyances in low areas.

This Fact Sheet does not apply to alterations of natural channels. Contact the local jurisdiction and/or the Corps of Engineers, Fort Worth District Office for information on regulatory requirements.

DESIGN CRITERIA

Temporary Channel Design

- All temporary channels shall be designed to carry the peak runoff for the 10-year design storm without eroding. Permanent channels must be designed in accordance with the iSWM Design Manual for Development/Redevelopment (and/or local requirements).
- Channels may be trapezoidal, parabolic, or v-shaped; however v-shaped channels may be difficult to stabilize, so they are generally used only where the volume and rate of flow is low.
- Side slopes shall be 3:1 or flatter to aid in the establishment of vegetation and/or for maintenance.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

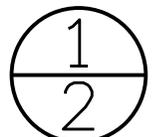
- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Varies

E-7



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CHANNEL PROTECTION

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CHANNEL PROTECTION

Grass-Lining

- Grass-lining is appropriate for grades less than 2 percent and velocities less than 6 feet per second.
- If the design velocity of a channel to be vegetated by seeding exceeds 2 feet per second, Erosion Control Blankets (Fact Sheet E-6) must be used to provide protection and assist in establishing the vegetation.
- Refer to the Fact Sheet E-4, Vegetation, for appropriate vegetation types and information on establishment of vegetation. In addition, consult manufacturer's literature where erosion control blankets are used.

Turf Reinforcement Mat Lining

- Turf reinforcement mats (TRMs) provide long-term erosion protection in channels where flow conditions exceed the ability of vegetation alone to withstand erosive forces (grades in excess of 2 percent or velocities exceeding 6 feet per second).
- Turf reinforcement mats may provide channel protection for conditions of up to approximately 8 lbs/ft² shear stress. The appropriate TRM product must be selected in accordance with the manufacturer's specifications to meet the design flow conditions.
- Turf reinforcement mats are generally preferred over stone stabilization.
- TRM installation and anchoring shall conform to the recommendations shown within the manufacturer's published literature.
- Refer to the Fact Sheet E-4, Vegetation, for appropriate vegetation types and information on establishment of vegetation. In addition, consult the TRM manufacturer's literature for special considerations.

Crushed Stone and Riprap

- As an alternate to turf reinforcement mats, a layer of crushed stone or rip-rap with appropriate size, gradation, and thickness depending on flow conditions may also be used for grades in excess of 2 percent or velocities exceeding 6 feet per second.
- The size and gradation of the stone or riprap and thickness of the lining must be designed appropriately for the flow conditions to prevent the lining from washing away.
- Riprap should be placed on a lining of geotextile fabric to prevent soil movement into or through the riprap. The geotextile must be keyed in at the top of the bank.

LIMITATIONS

The vegetation for grass-lined channels may be difficult to establish unless the seedbed is protected from high flows until the seed germinates and matures.

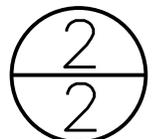
MAINTENANCE REQUIREMENTS

Channel protection measures should be inspected regularly (at least as often as required by the TPDES Construction General Permit) for signs of bare spots, erosion, or excessive sediment deposition. Bare spots or areas experiencing erosion should be repaired immediately by replacing lining material. Where excessive sediment is discovered, remove sediment and repair lining as necessary. In addition, determine the source of excess sediment and implement appropriate BMPs to control the erosion.

While vegetation is being established for grass-lining and turf reinforcement mats, check frequently to ensure proper growing conditions and adequate coverage. Also, remove any accumulated sediment in the channel bottom frequently to prevent damage to the vegetation.

SPECIFICATIONS

No specification for construction of temporary channel protection is currently available in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments.



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CHANNEL PROTECTION

DUST CONTROL

DESCRIPTION

Dust control includes those measures necessary to prevent wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

PRIMARY USE

Dust control is applied in areas (including roadways) subject to surface and air movement to dust where on-site and off-site impacts to roadways, drainage ways, or surface waters are likely.

DESIGN CRITERIA

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition, if stable. Maintain the original cover as long as practicable.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until dampened sufficiently to prevent dust and repeat as needed. Do not apply water in quantities to cause runoff.
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.

SPECIFICATIONS

No specification for construction of this item is currently available in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments.

Applications

- Perimeter Control
- Slope Protection
- Sediment Trapping
- Channel Protection
- Temporary Stabilization
- Permanent Stabilization
- Waste Management
- Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients/Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

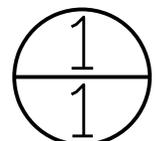
Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

E-8



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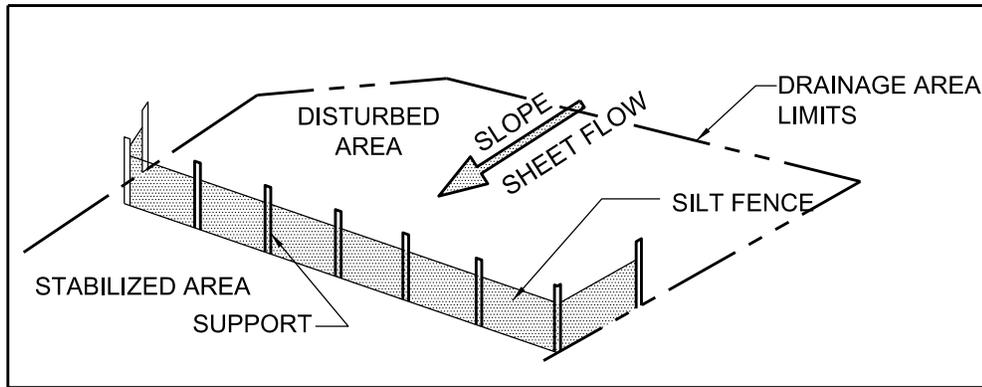


DUST CONTROL

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SILT FENCE



DESCRIPTION

A silt fence consists of geotextile fabric supported by wire mesh netting or other backing stretched between metal posts with the lower edge of the fabric securely embedded six-inches in the soil. The fence is typically located downstream of disturbed areas to intercept runoff in the form of sheet flow. A silt fence provides both filtration and time for sediment settling by reducing the velocity of the runoff.

PRIMARY USE

Silt fence is normally used as perimeter control located downstream of disturbed areas. It is only feasible for non-concentrated, sheet flow conditions. If it becomes necessary to place a silt fence where concentrated flows may be experienced (e.g. where two silt fences join at an angle, or across minor channels or gullies), it will be necessary to reinforce the silt fence at that area by a rock berm or sand bag berm, or other structural measures that will support the silt fence.

APPLICATIONS

Silt fence is an economical means to treat overland, non-concentrated flows for all types of projects. Silt fences are used as perimeter control devices for both site developers and linear (roadway) type projects. They are most effective with coarse to silty soil types. Due to the potential of clogging and limited effectiveness, silt fences should be used with caution in areas that have predominantly clay soil types. In this latter instance a soils engineer or soil scientist should confirm the suitability of silt fence for that application

DESIGN CRITERIA

- Fences are to be constructed along a line of constant elevation (along a contour line) where possible.
- Maximum drainage area shall be 0.25 acre per 100 linear feet of silt fence.
- Maximum flow to any 20 foot section of silt fence shall be 1 CFS.
- Maximum distance of flow to silt fence shall be 200 feet or less. If the slope exceeds 10 percent the flow distance shall be less than 50 feet.
- Maximum slope adjacent to the fence shall be 2:1.
- If 50% or less soil, by weight, passes the U.S. Standard sieve No. 200; select the apparent opening size (A.O.S.) to retain 85% of the soil.
- If 85% or more of soil by weight, passes the U.S. Standard sieve No. 200, silt fences shall not be used unless the soil mass is evaluated and deemed suitable by a soil scientist or geotechnical engineer concerning the erodibility of the soil mass, dispersive characteristics, and the potential grain-size characteristics of the material that is likely to be eroded.

Applications

Perimeter Control
Slope Protection
Sediment Trapping
Channel Protection
Temporary Stabilization
Permanent Stabilization
Waste Management
Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.75

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SILT FENCE

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SILT FENCE

- Stone overflow structures or other outlet control devices shall be installed at all low points along the fence or spaced at approximately 300 feet if there is no apparent low point.
- Filter stone for overflow structure shall be 1-1/2" washed stone containing no fines. Angular shaped stone is preferable to rounded shapes.
- Silt fence fabric must meet the following minimum criteria:
 - Tensile Strength, ASTM D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles, 90-lbs.
 - Puncture Rating, ASTM D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products, 60-lbs.
 - Mullen Burst Rating, ASTM D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method, 280-psi.
 - Apparent Opening Size, ASTM D4751 Test Method for Determining Apparent Opening Size of a Geotextile, U.S. Sieve No. 70 (max) to No. 100 (min)
 - Ultraviolet Resistance, ASTM D4355. Minimum 70 percent.
- Fence posts shall be galvanized steel and may be T-section or L-section, 1.3 pounds per linear foot minimum, and 4 feet in length minimum.
- Silt fence shall be supported by galvanized steel wire fence fabric as follows:
 - 4" x 4" mesh size, W1.4 /1.4, minimum 14-gauge wire fence fabric;
 - Hog wire, 12 gauge wire, small openings installed at bottom of silt fence;
 - Standard 2" x 2" chain link fence fabric; or
 - Other welded or woven steel fabrics consisting of equal or smaller spacing as that listed herein and appropriate gauge wire to provide support.
- A 6-inch wide trench is to be cut 6 inches deep at the toe of the fence to allow the fabric to be laid below the surface and backfilled with compacted earth or gravel to prevent bypass of runoff under the fence. Fabric shall overlap at abutting ends a minimum of 3 feet and shall be joined such that no leakage or bypass occurs.
- Sufficient room for the operation of sediment removal equipment shall be provided between the silt fence and other obstructions in order to properly maintain the fence.
- The ends of the fence shall be turned upstream to prevent bypass of storm water.

LIMITATIONS

Minor ponding will likely occur at the upstream side of the silt fence, which could result in minor localized flooding. Silt fences are not intended for use as check dams in swales or low areas subject to concentrated flow. Silt fences shall not be used where soil conditions prevent a minimum toe-in depth of 6 inches or installation of support posts to a depth of 12 inches.

Silt fence can interfere with construction operations; therefore planning of access routes onto the site is critical. Silt fence can fail structurally under heavy storm flows, creating maintenance problems and reducing the effectiveness of the system.

MAINTENANCE REQUIREMENTS

Silt fence should be inspected regularly (at least as often as required by the TPDES Construction General Permit) for buildup of excess sediment, undercutting, sags, and other failures. Sediment should be removed when it reaches approximately one-half the height of the fence. In addition, determine the source of excess sediment and implement appropriate BMPs to control the erosion. If the fabric becomes damaged or clogged, it should be repaired or replaced as necessary.

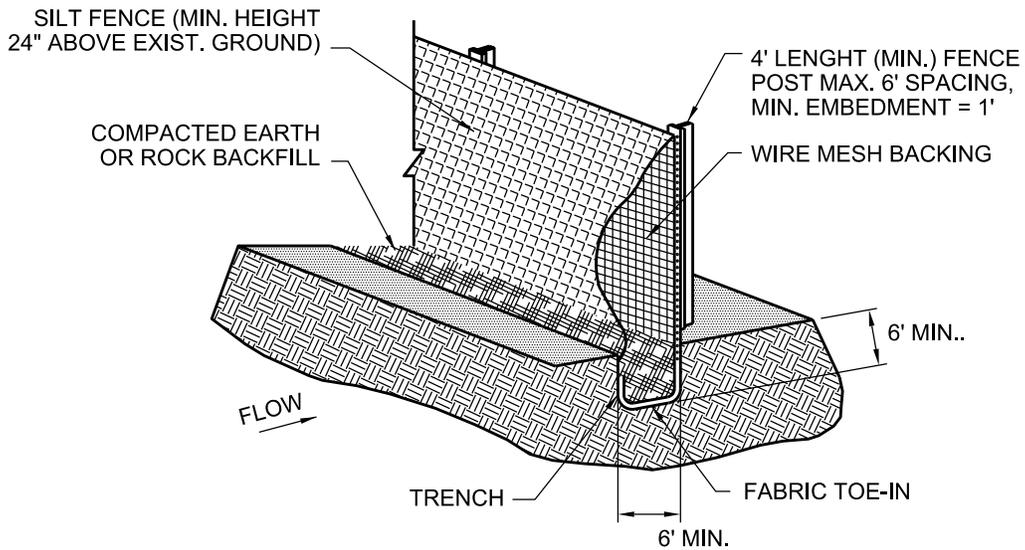
SPECIFICATIONS

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.5 Silt Fence.

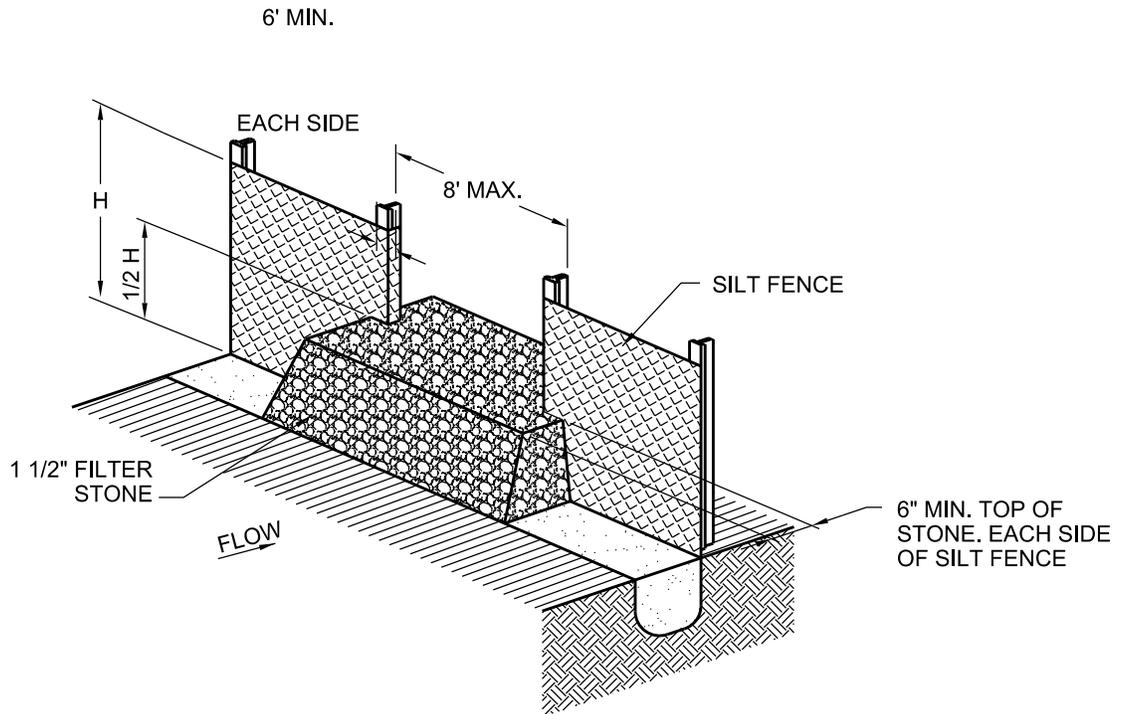
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SILT FENCE & STONE OVERFLOW STRUCTURE



SILT FENCE



STONE OVERFLOW STRUCTURE

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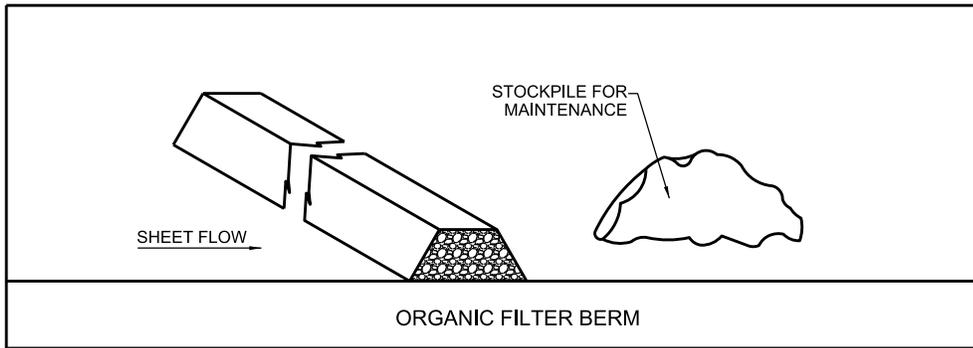
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SILT FENCE & STONE OVERFLOW STRUCTURE

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ORGANIC FILTER BERM



DESCRIPTION

Organic filter berms are linear berms constructed of a mix of compost and mulch and placed on a contour to control runoff and filter sediment. The organic filter berm provides both filtration and time for sediment settling by reducing the velocity of the runoff.

PRIMARY USE

Organic filter berms are very well suited to sites with small disturbed drainage areas that are not subjected to concentrated flows and that will ultimately be seeded, sodded, or landscaped.

APPLICATIONS

Properly designed, the organic filter berm is economical due to the ease of emplacement and because it can be tilled into the soil at the end of project, limiting the cost of removal and adding to the organic content of the soil. The berms are used as perimeter control devices for both development sites and linear (roadway) type projects. They are most effective with coarse to silty soil types.

DESIGN CRITERIA

- Filter berms are to be constructed along a line of constant elevation (along a contour line) where possible.
- Maximum drainage area shall be 0.25 acre per 100 linear feet of filter berm.
- Maximum flow to any 20 foot section of filter berm shall be 1 CFS.
- Maximum distance of flow to berm shall be 200 feet or less. If the slope exceeds 10 percent the flow distance shall be less than 50 feet.
- Maximum slope adjacent to the filter berm shall be 2:1.
- Trapezoidal shaped berms should be 1-1/2 to 3 feet high with a top width of 2 to 3 feet and a base of 3 to 5 feet wide.
- Windrow (triangular) shaped berms should be 1 to 2 feet high and 2 to 4 feet wide.
- Organic filter berms shall be constructed of a mixture of 50% compost and 50% wood mulch. The compost shall meet the Physical Requirements specified in Table 1 of TxDOT Special Specification 1058, Compost, which can be found in Appendix F. Mulch shall be untreated wood chips less than or equal to 5 inches in length with 95% passing a 2-inch screen and less than 30% passing a 1-inch screen.
- Organic filter berms may be seeded with a seed loading of 1 lb. per 10 linear feet for small berms (1ft. by 2 ft.) or 2.25 lbs per 10 linear ft. for larger berms (1.5 ft. by 3 ft.)

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.75

S-2

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 Project No. : STANDARD-DETAILS


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**ORGANIC FILTER
 BERM**

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ORGANIC FILTER BERM

LIMITATIONS

Minor ponding will likely occur at the upstream side of the organic filter berm that could result in minor localized flooding.

Berms should not be constructed in swales or low areas since they will be subject to concentrated flow and may be overtopped resulting in failure of the filter berm.

Berms can interfere with construction operations; therefore planning of access routes onto the site is critical. Typically excess material is stockpiled on site for repairs to berms disturbed by construction activity.

MAINTENANCE REQUIREMENTS

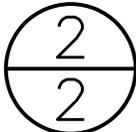
Filter berms should be inspected regularly (at least as often as required by the TPDES Construction General Permit, Appendix A) for buildup of excess sediment, undercutting, and other failures. Silt must be removed when it reaches 1/2 the height of the berm. Silt may be raked from the disturbed side of the device to clean side the berm for the first few times that it becomes clogged to prevent ponding. Repeated clogging of the berm at one location will require replacement of the organic filter material or may require installation of another BMP to prevent failure of the berm.

Dimensions of the berm must be maintained by replacing organic filter material when necessary.

There shall be no signs of erosion, breaching or runoff around or under the berm.

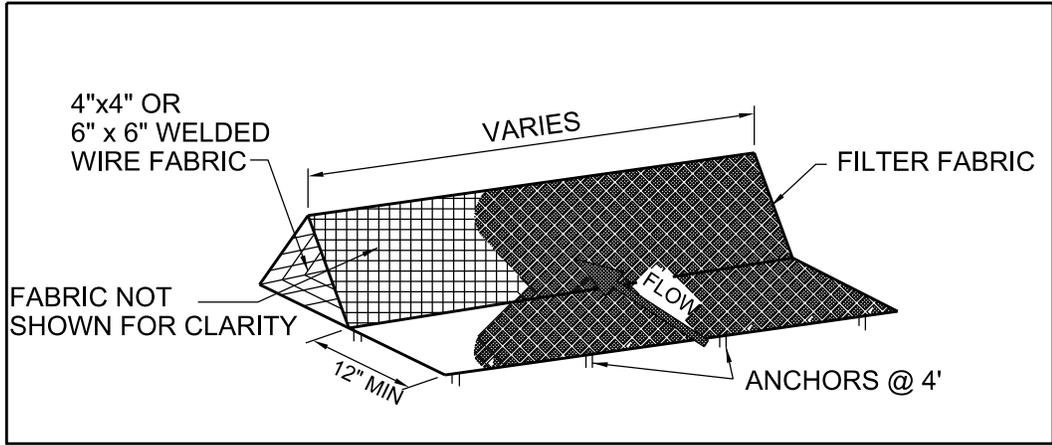
SPECIFICATIONS

No specification for construction of this item is currently available in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments.



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TRIANGULAR SEDIMENT FILTER DIKE



DESCRIPTION

A Triangular Sediment Filter Dike is a self-contained silt fence consisting of filter fabric wrapped around welded wire fabric shaped into a triangular cross section. While similar in use to a silt fence, the dike is reusable, sturdier, transportable, and can be used on paved areas or in situations where it is impractical to install embedded posts for support.

PRIMARY USE

Triangular filter dikes are used in place of silt fence, treating sediment flow at the perimeter of construction areas and at the perimeter of the site. Also, the dikes can serve as stream protection devices by preventing sediment from entering the streams or as check dams in small swales.

Triangular sediment filter dikes are especially useful for construction areas surrounded by pavement, where silt fence, filter berm, or other BMP installation is impractical.

APPLICATIONS

Triangular dikes are used to provide perimeter control by detaining sediment on a disturbed site with drainage that would otherwise flow onto adjacent properties. Triangular dikes also serve as sediment trapping devices when used in areas of sheet flow across disturbed areas or are placed along stream banks to prevent sediment-laden sheet flow from entering the stream. The dikes can be subjected to more concentrated flows and a higher flow rate than silt fence.

DESIGN CRITERIA

- Dikes can be used on a variety of surfaces ranging from disturbed earth to pavement.
- Dikes are to be installed along a line of constant elevation (along a contour line).
- Maximum drainage area shall be 0.25 acre per 100 linear feet of dike.
- Maximum flow to any 20 foot section of dike shall be 1 CFS.
- Maximum distance of flow to dike shall be 200 feet or less. If the slope exceeds 10 percent the flow distance shall be less than 50 feet.
- Maximum slope adjacent to the dike shall be 2:1.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.75

S-3

1/3

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**TRIANGULAR SEDIMENT
 FILTER DIKE**

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TRIANGULAR SEDIMENT FILTER DIKE

- If 50% or less of soil, by weight, passes the U.S. Standard sieve No. 200, select the apparent opening size (A.O.S.) to retain 85% of the soil.
- If 85% or more of soil, by weight, passes the U.S. Standard Sieve No. 200, triangular sediment dike shall not be used due to clogging.
- The filter fabric shall meet the material requirements specified in BMP Fact Sheet S-1, Silt Fence.
- The internal support for the dike structure shall be 6 gauge 6" x 6" wire mesh folded into triangular form eighteen (18) inches on each side.
- Filter material shall lap over ends six (6) inches to cover dike-to-dike junction; each junction shall be secured by shoat rings.
- Tie-in to the existing grade should be accomplished by (i) embedding the fabric six-inches below the top of ground on the upslope side, (ii) extending the fabric to form a 12-inch skirt on the upstream slope and covering it with 3 to 5 inches of crushed rock, or (iii) entrenching the base of the triangular dike four-inches below ground. For (ii) above, the skirt and the upslope portion of the triangular dike skeleton should be anchored by metal staples on two-foot centers, driven a minimum of six inches into the ground (except where crossing pavement or exposed limestone).
- Sand bags or large rock should be used as ballast inside the triangular dike section to stabilize the dike against the effects of high flows.
- Sufficient room for the operation of sediment removal equipment shall be provided between the dike and other obstructions in order to properly remove sediment.
- The ends of the dike shall be turned upgrade to prevent bypass of storm water.

LIMITATIONS

Effects of ponding caused by the dikes should be evaluated for effects on adjacent areas. Triangular sediment filter dikes are not effective for conditions where there are substantial concentrated flows or when they are not constructed along a contour line due to the potential for flow concentration and overtopping.

MAINTENANCE REQUIREMENTS

Triangular sediment filter dikes should be inspected regularly (at least as often as required by the TPDES Construction General Permit). Sediment should be removed when it reaches approximately 6 inches in depth. If the fabric becomes clogged, it should be cleaned or, if necessary, replaced. If structural deficiencies are found, the dike should be immediately repaired or replaced.

As with silt fence, integrity of the filter fabric is important to the effectiveness of the dike. Overlap between dike sections must be checked on a regular basis and repaired if deficient.

SPECIFICATIONS

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.8 Triangular Sediment Filter Dike.

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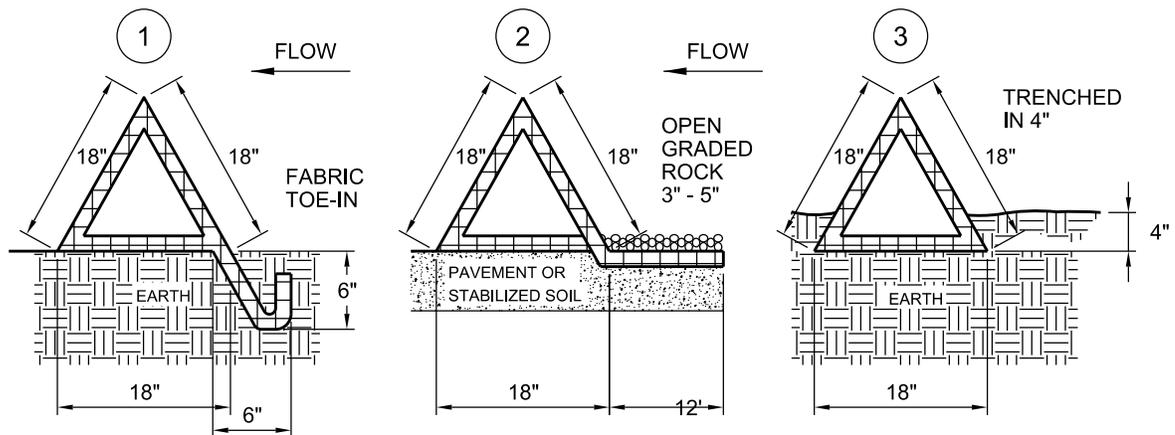
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TRIANGULAR SEDIMENT
FILTER DIKE

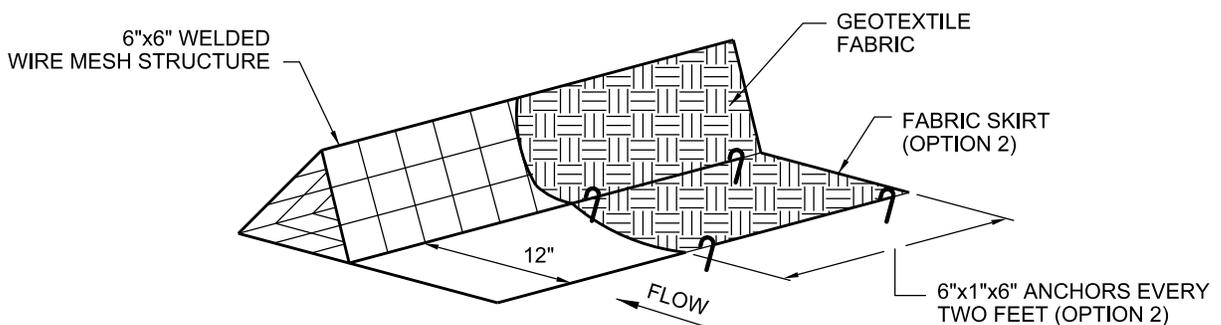
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TRIANGULAR SEDIMENT FILTER DIKE



CROSS SECTION OF INSTALLATION OPTIONS

1. TOE-IN 6" MIN.
2. FABRIC SKIRT WEIGHTED WITH ROCK
3. TRENCHED IN 4"



3
3

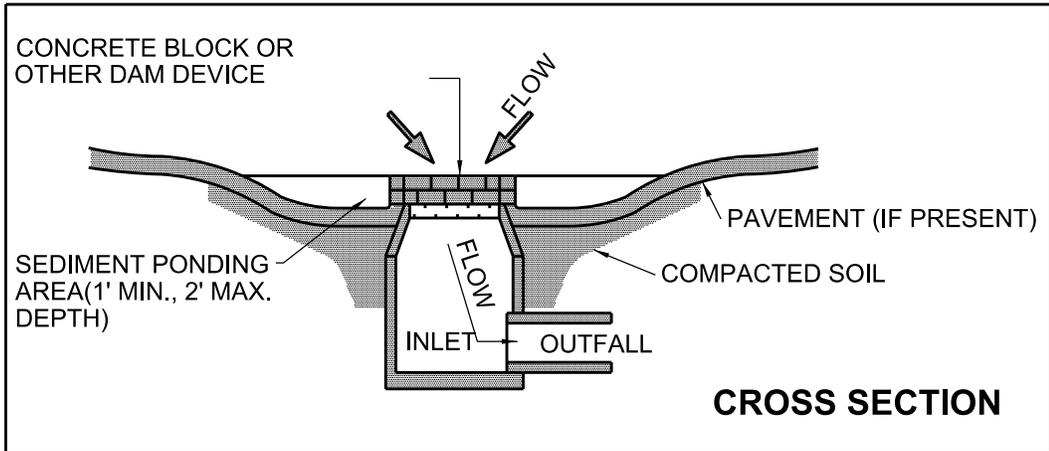
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**TRIANGULAR SEDIMENT
 FILTER DIKE**

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INLET PROTECTION



DESCRIPTION

Inlet protection consists of a variety of methods of intercepting sediment at low point inlets through the use of stone, filter fabric, inlet inserts, and other materials. This is normally located at the inlet, providing either detention or filtration to reduce sediment and floatable materials in storm water.

PRIMARY USE

Inlet protection should be considered a secondary defense in site erosion control due to the limited effectiveness and applicability of the technique. It is normally used in new developments that include new inlets or roads with new curb inlets or during major repairs to existing roadways.

Inlet protection has limited use in developed areas due to the potential for flooding, traffic safety, pedestrian safety, and maintenance problems. Inlet protection can reduce sediment in storm sewer systems by serving as a back up system to onsite controls or by reducing sediment loads from controls with limited effectiveness.

APPLICATIONS

Different inlet protection variations are used for different conditions as follows:

- Filter barrier protection (similar to a silt fence barrier around the inlet) is appropriate when the drainage area is less than one acre and the basin slope is less than five (5) percent. This type of protection is not applicable in paved areas.
- Block and gravel (crushed stone, recycled concrete is also appropriate) protection is used when flows exceed 0.5 c.f.s. and it is necessary to allow for overtopping to prevent flooding.
- Excavated impoundment protection around a drop inlet may be used for protection against sediment entering a storm drain system. With this method, it is necessary to install weep holes to allow the impoundment to drain completely. The impoundment shall be sized such that the volume of excavation shall be equal to 1800 to 3600 cubic feet per acre of disturbed area entering the inlet for full effectiveness.

Applications

- Perimeter Control
- Slope Protection
- Sediment Trapping
- Channel Protection
- Temporary Stabilization
- Permanent Stabilization
- Waste Management
- Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Varies

S-4



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 STANDARD DETAILS

INLET PROTECTION

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INLET PROTECTION

DESIGN CRITERIA

- Special caution must be exercised when installing inlet protection on publicly traveled streets or in developed areas. Ensure that inlet protection is properly designed, installed and maintained to avoid flooding of the roadway or adjacent properties and structures.
- Filter fabric protection shall be designed and maintained in a manner similar to silt fence.
- Where applicable, filter fabric, posts, and wire backing shall meet the material requirements specified in BMP Fact Sheet S-1, Silt Fence.
- Filter gravel shall be ¾ inch (Block and Gravel Protection) or 1-1/2 to 2 inch (Excavated Impoundment Protection) washed stone containing no fines. Angular shaped stone is preferable to rounded shapes.
- Concrete blocks shall be standard 8" x 8" x 16" concrete masonry units.
- Maximum depth of flow shall be eight (8) inches or less.
- Positive drainage is critical in the design of inlet protection. If overflow is not provided for at the inlet, excess flows shall be routed through established swales, streets, or other watercourses to minimize damage due to flooding.
- Filter Barrier Protection
Silt Fence shall consist of nylon geotextile supported by wire mesh, W1.4 X W1.4, and galvanized steel posts set a minimum of 1 foot depth and spaced not more than 6 feet on center. A 6 inch wide trench is to be cut 6 inches deep at the toe of the fence to allow the fabric to be laid below the surface and backfilled with compacted earth or gravel. This entrenchment prevents any bypass of runoff under the fence.
- Block and Gravel Protection (Curb and Drop Inlets)
Concrete blocks are to be placed on their sides in a single row around the perimeter of the inlet, with ends abutting. Openings in the blocks should face outward, not upward. ½" x ½" wire mesh shall then be placed over the outside face of the blocks covering the holes. Filter stone shall then be piled against the wire mesh to the top of the blocks with the base of the stone being a minimum of 18 inches from the blocks. Alternatively, where loose stone is a concern (streets, etc.), the filter stone may be placed in appropriately sized geotextile fabric bags. Periodically, when the stone filter becomes clogged, the stone must be removed and cleaned in a proper manner or replaced with new stone and piled back against the wire mesh.
- Excavated Impoundment Protection
An excavated impoundment shall be sized to provide a storage volume of between 1800 and 3600 cubic feet per acre of disturbed area. The trap shall have a minimum depth of one foot and a maximum depth of 2 feet as measured from the top of the inlet and shall have sideslopes of 2:1 or flatter. Weep holes are to be installed in the inlet walls to allow for the complete dewatering of the trap. When the storage capacity of the impoundment has been reduced by one-half, the silt shall be removed and disposed in a proper manner.
- Inlet inserts are commercially available to remove sediment, constituents (pollutants) adsorbed to sediment, and oil and grease. Maintenance is required to removed sediment and debris that could clog the filters. Inlet inserts must have a bypass function to prevent flooding from clogging or high flows.

LIMITATIONS

Special caution must be exercised when installing inlet protection on publicly traveled streets or in developed areas. Ensure that inlet protection is properly designed, installed and maintained to avoid flooding of the roadway or adjacent properties and structures.

Inlet protection is only viable at low point inlets. Inlets that are on a slope cannot be effectively protected because storm water will bypass the inlet and continue downstream, causing an overload condition at inlets downstream.



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INLET PROTECTION

MAINTENANCE REQUIREMENTS

Inlet protection should be inspected regularly (at least as often as required by the TPDES Construction General Permit). When silt fence is used and the fabric becomes clogged, it should be cleaned or, if necessary, replaced. Also, sediment should be removed when it reaches approximately one-half the height of the inlet protection device. If a sump is used, sediment should be removed when the volume of the basin is reduced by 50%.

For systems using filter stone, when the filter stone becomes clogged with sediment, the stones must be pulled away from the inlet and cleaned or replaced. Since cleaning of stone at a construction site may be difficult, an alternative approach would be to use the clogged stone as fill material and put new stone around the inlet.

SPECIFICATION

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.15 Inlet Protection.

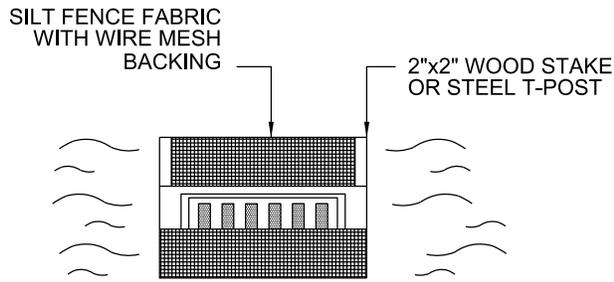


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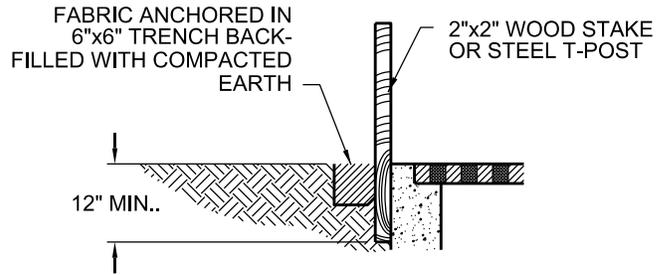


INLET PROTECTION

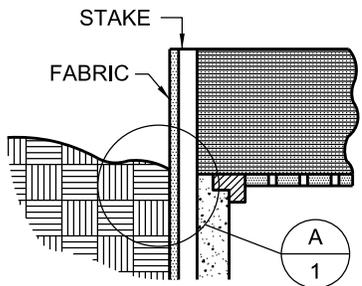
INLET PROTECTION



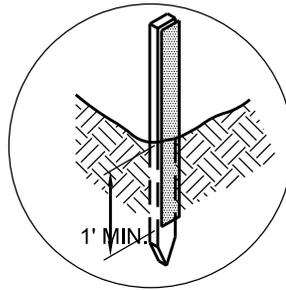
PERSPECTIVE VIEW



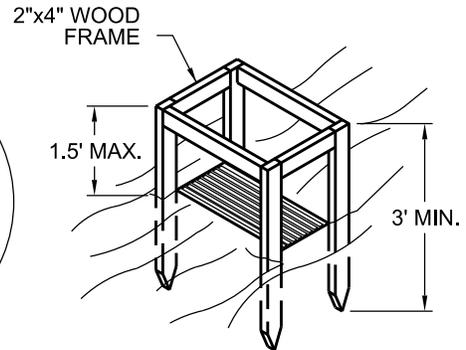
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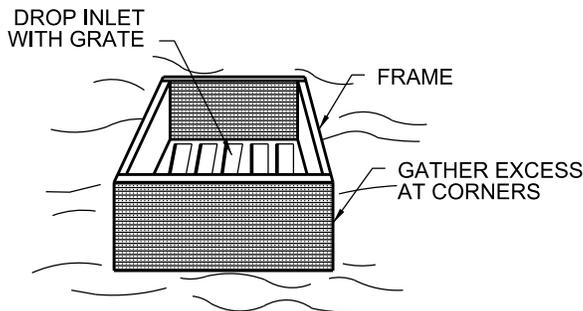
ELEVATION OF STAKE AND FABRIC ORIENTATION



DETAIL A



PERSPECTIVE VIEW



PERSPECTIVE VIEW

SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE THE INLET SHEET OR OVER-LAND FLOWS (NOT TO EXCEED 1 c.F.S.) ARE TYPICAL. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS SUCH AS IN STREETS OR HIGHWAY MEDIANS.



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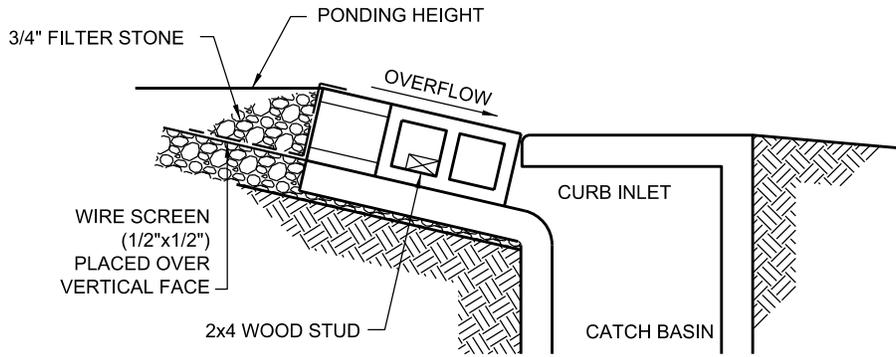


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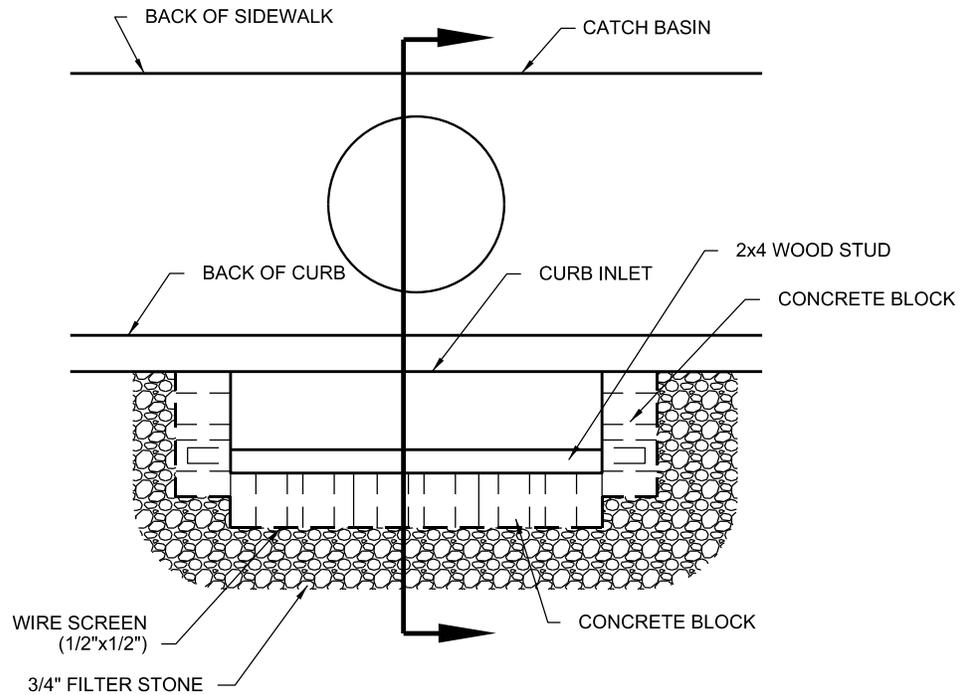
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INLET PROTECTION



CROSS SECTION



PLAN VIEW

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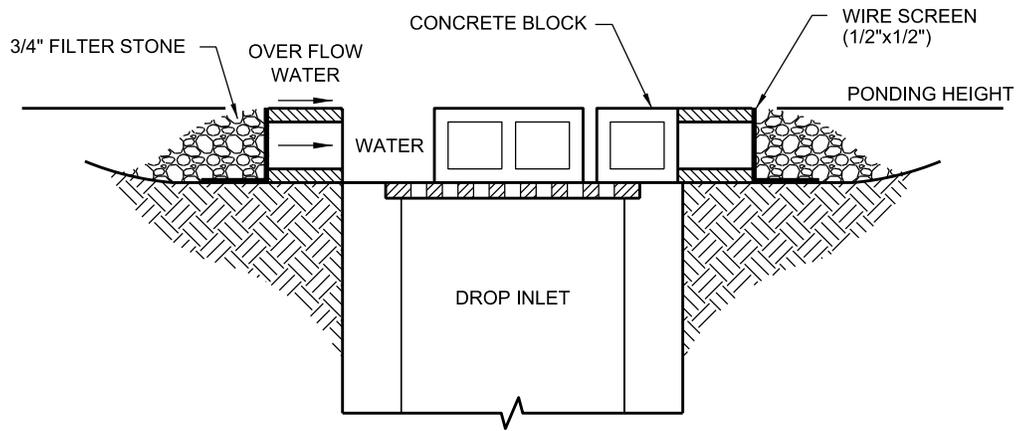
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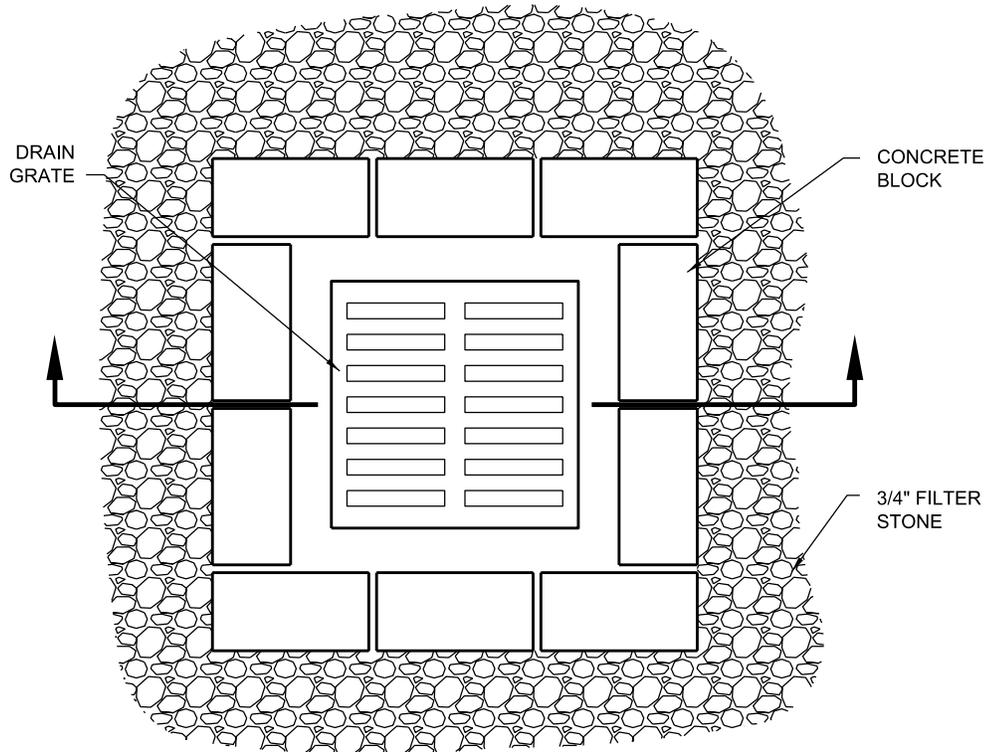
INLET PROTECTION

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INLET PROTECTION



CROSS SECTION



PLAN VIEW

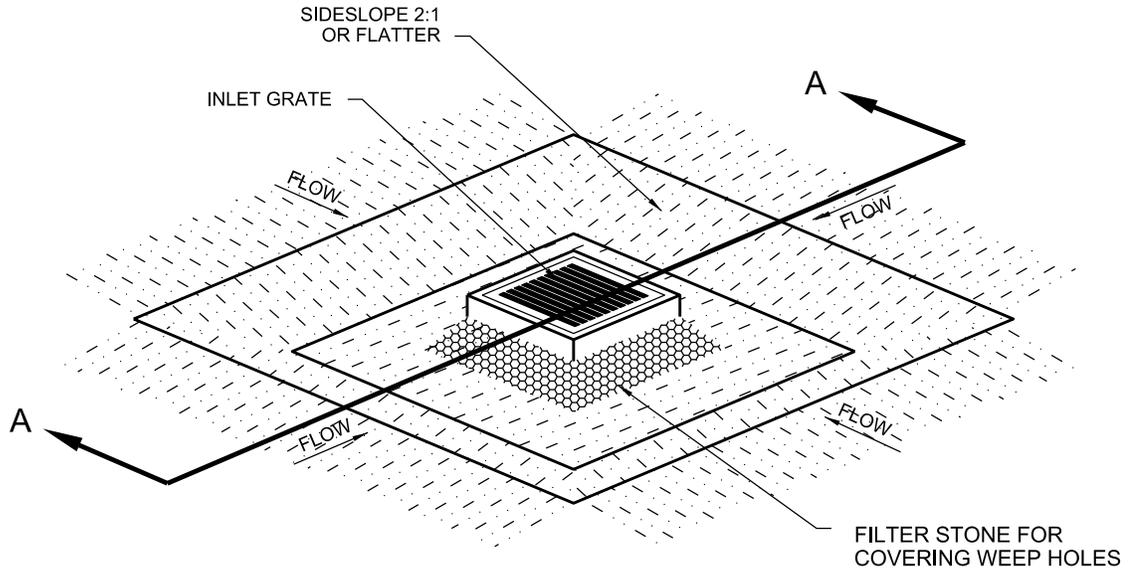
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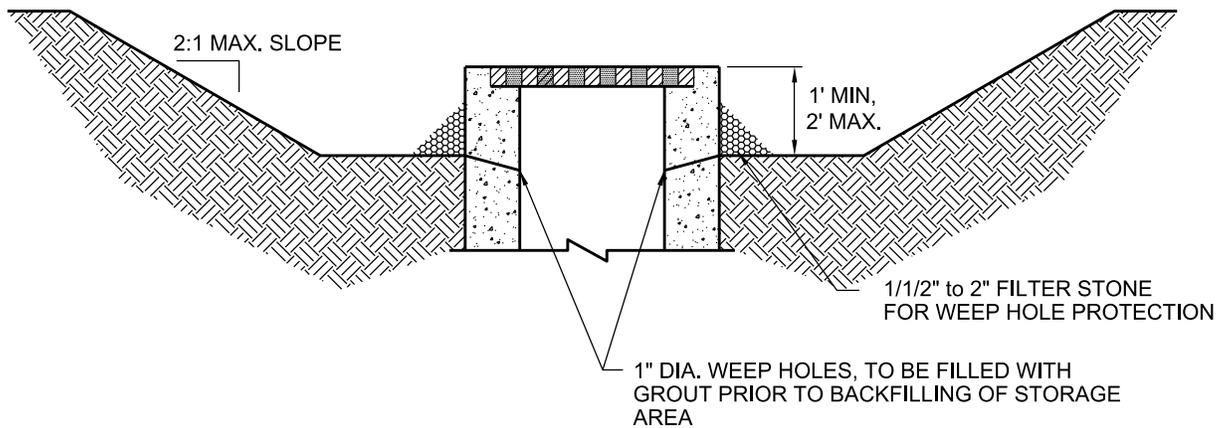


INLET PROTECTION

INLET PROTECTION



ISOMETRIC PLAN VIEW



SECTION A-A



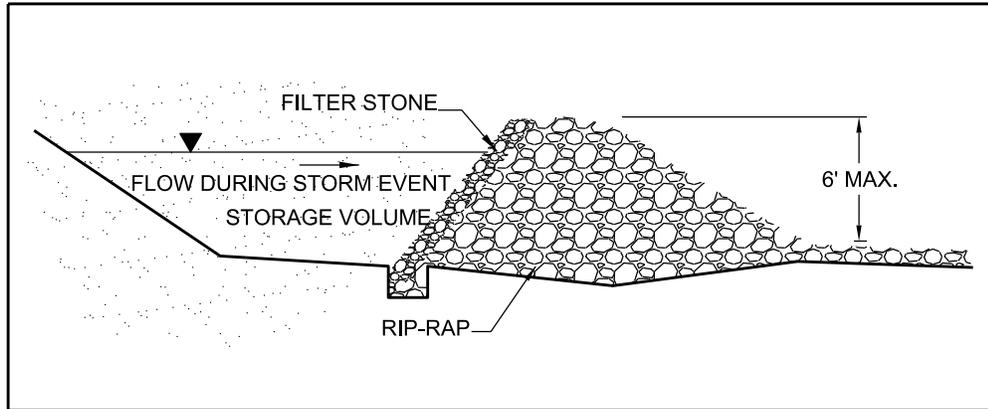
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INLET PROTECTION

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STONE OUTLET SEDIMENT TRAP



DESCRIPTION

A stone outlet sediment trap is a small ponding area formed by placing a stone embankment with an integral stone filter outlet across a drainage swale for the purpose of detaining sediment-laden runoff generated by construction activities. The sediment trap detains runoff long enough to allow most of the suspended sediment to settle while still allowing for diffused flow of runoff.

PRIMARY USE

A sediment trap is used in situations where flows are concentrated in a drainage swale or channel. The sediment trap reduces velocities and allows for settling of sediment while allowing the area behind the trap to de-water. This is normally used for long term (18 months or less) applications in which a sediment basin is not feasible due to site or construction method restrictions.

APPLICATIONS

Temporary stone outlet sediment traps are installed at locations where concentrated flows require a protected outlet to contain sediment or spread flow prior to discharge.

DESIGN CRITERIA

- The maximum drainage area contributing to the trap shall be 10 acres. For larger drainage areas a sediment basin should be used.
- The minimum storage volume shall be 1800 cubic feet per acre of disturbed land draining to the device.
- The surface area of the design storage area shall be 1% of the area draining to the device.
- The maximum embankment height shall be 6 feet as measured from the toe of the slope on the downstream side
- Minimum width of the embankment at the top shall be 2 feet.
- Embankment slope shall be 1.5:1 or flatter.
- The embankment shall have a depressed area to serve as the outlet with a minimum width of 4 feet.
- A six inch minimum thickness layer of ¾ to 2 inch (1-½ inch nominal) well graded filter stone shall be placed on the face of the embankment.
- The embankment shall be comprised of well graded stone with a size range of 6 to 12 inches in diameter. The stone may be enclosed in wire mesh or gabion basket and anchored to the channel bottom to prevent washing away.
- The outlet shall be designed to have a minimum freeboard of 6" at design flow.

Applications

- Perimeter Control
- Slope Protection
- Sediment Trapping**
- Channel Protection
- Temporary Stabilization
- Permanent Stabilization
- Waste Management
- Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.85

S-5



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**STONE OUTLET
 SEDIMENT TRAP**

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STONE OUTLET SEDIMENT TRAP

- The embankment shall be place on geotextile fabric meeting the following minimum criteria:
 - Tensile Strength, ASTM D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles, 250-lbs
 - Puncture Rating, ASTM D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products, 135-lbs.
 - Mullen Burst Rating, ASTM D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method, 420-psi.
 - Apparent Opening Size, ASTM D4751 Test Method for Determining Apparent Opening Size of a Geotextile, U.S. Sieve No. 20 (max).
- The geotextile fabric, covered with a layer of stone, shall extend past the base of the embankment on the downstream side a minimum of 2 feet.

LIMITATIONS

Limited applications due to cost of construction, availability of materials, and the amount of land required.

Can cause minor upstream flooding, possibly impacting construction operations.

MAINTENANCE REQUIREMENTS

The stone outlet structure should be inspected regularly (at least as often as required by the TPDES Construction General Permit, Appendix A) to check for clogging of the void spaces between stones. If the aggregate appears to be silted in such that efficiency is diminished, the stone should be replaced.

Deposited sediment shall be removed when the depth of sediment is equal to one-third of the height of the embankment as measured from the original toe of slope to the crest of the outlet, or has reached a depth of one foot, whichever is less. The removed sediment shall be stockpiled or redistributed in areas that are protected from erosion.

SPECIFICATION

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.12 Stone Outlet Sediment Trap.

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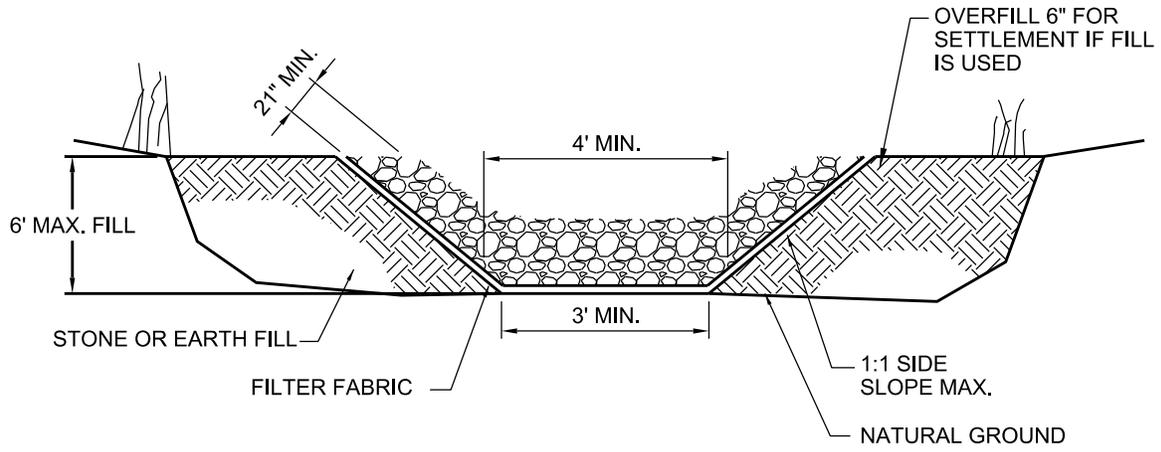


STONE OUTLET
SEDIMENT TRAP

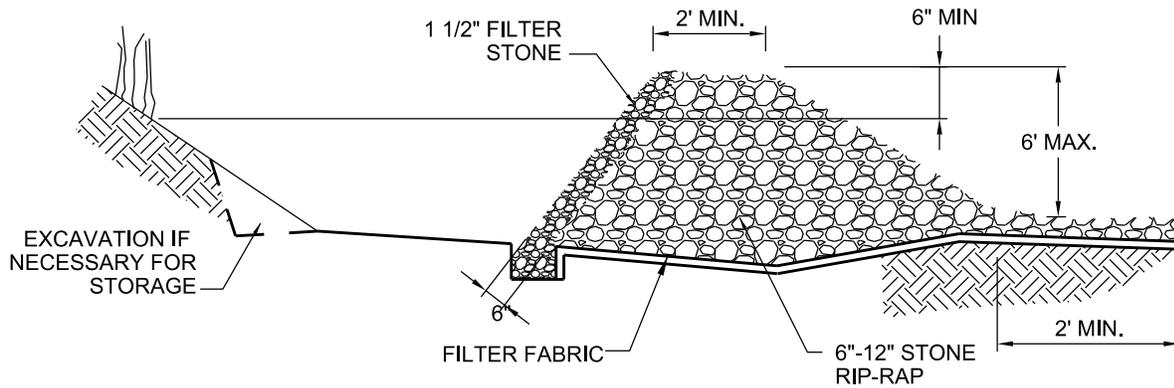
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STONE OUTLET SEDIMENT TRAP



VIEW LOOKING UPSTREAM



SECTION



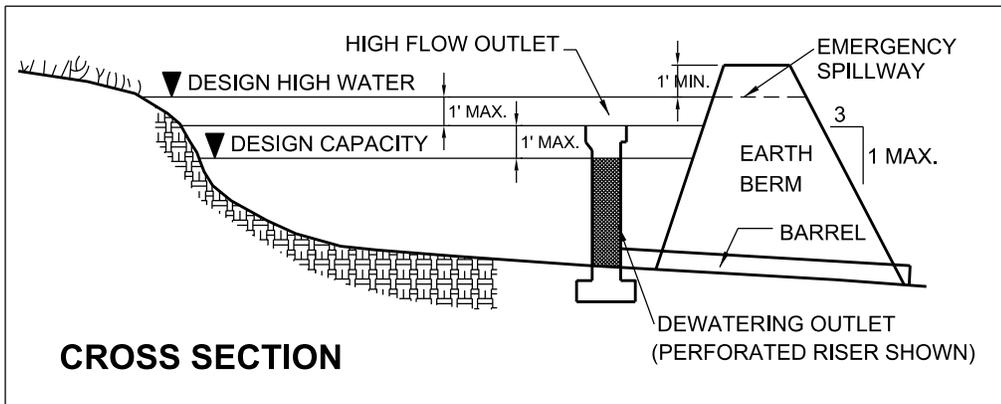
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**STONE OUTLET
 SEDIMENT TRAP**

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SEDIMENT BASIN



DESCRIPTION

A sediment basin is a pond area with a controlled outlet in which sediment-laden runoff is directed to allow settling of suspended sediment from the runoff. It provides treatment for the runoff as well as detention and controlled release of runoff, minimizing flood impacts downstream.

PRIMARY USE

Sediment basins should be used for all sites with adequate open space to locate the basin and where the site topography directs a majority of the site drainage into the basin. For sites with disturbed areas of 10 acres and larger that are part of a common drainage area, sediment basins are necessary as either temporary or permanent controls, unless specific site condition limit their use

APPLICATIONS

Sediment basins serve as treatment devices which can be used on a variety of project types. They are normally used in site development projects in which large areas of land are available for the basin, a minor stream or off-line drainage way crosses the site, or a specific water feature is planned for the site. Sediment basins are highly effective at reducing sediment and other pollutants for design storm conditions. Sediment basins are typically easier to maintain than other structural controls (e.g. silt fences, etc).

DESIGN CRITERIA

- Refer to the manual for specific design guidance on temporary sediment basins.
- The iSWM Design Manual for Development/ Redevelopment should be used for guidance on the design of permanent sediment basins
- Minimum capacity of the basin shall be the calculated volume of runoff from a 2-year, 24-hour duration storm event.
- Deposited sediment shall be removed when the storage capacity of the basin has been reduced by 20%.
- Minimum width of the embankment at the top shall be 8 feet.
- Embankment slope shall be 3:1 or flatter.
- Maximum embankment height shall be 6 feet as measured from the toe of slope on the downstream side. Sediment basins with embankments exceeding 6 feet are regulated by the Texas Commission on Environmental Quality and must meet specific requirements for dam safety.

Applications

Perimeter Control

Slope Protection

Sediment Trapping

Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.90

S-6

1/3

Scale : N/A Date : 02/21/05

Design : COG

Drawn : COG

Dwg. File : ERO_021.DWG

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SEDIMENT BASIN

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SEDIMENT BASIN

- The basin outlet shall be designed to accommodate a 25-year design storm without causing damage to the containment structure.
- The sediment basin shall have minimum design dewatering time of 36 hours.
- The basin must be laid out such that the effective flow length of the basin should be at least twice the effective flow width.
- The outlet of the outfall pipe (barrel) shall be stabilized with riprap or other form of stabilization with design flows and velocities based on 25-year design storm peak flows. For velocities in excess of 5 feet per second, velocity dissipation measures should be used to reduce outfall velocities.
- The effectiveness of sediment basins may be increased by using baffles to prevent short-circuiting of flow through the basin.

SPECIAL CONSIDERATION

Sediment basins must be designed, constructed, and maintained to minimize mosquito breeding habitats by minimizing the creation of standing water. Whenever possible, water should be held less than 72 hours.

LIMITATIONS

Sediment basins can be rather large depending on site conditions, requiring the use of expensive development area and comprehensive planning for construction phasing prior to implementation.

Storm events which exceed the design storm event can cause damage to the spillway structure of the basin and may impact downstream concerns.

MAINTENANCE REQUIREMENTS

Sediment basins should be inspected regularly (at least as often as required by the TPDES Construction General Permit) to check for damage and to insure that obstructions are not diminishing the effectiveness of the structure. Sediment shall be removed and the basin shall be regraded to its original dimensions at such point that the capacity of the impoundment has been reduced to 20% of its original storage capacity. The removed sediment shall be stockpiled or redistributed in areas that are protected by erosion and sediment controls.

SPECIFICATIONS

No specification for construction of this item is currently available in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments.

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3

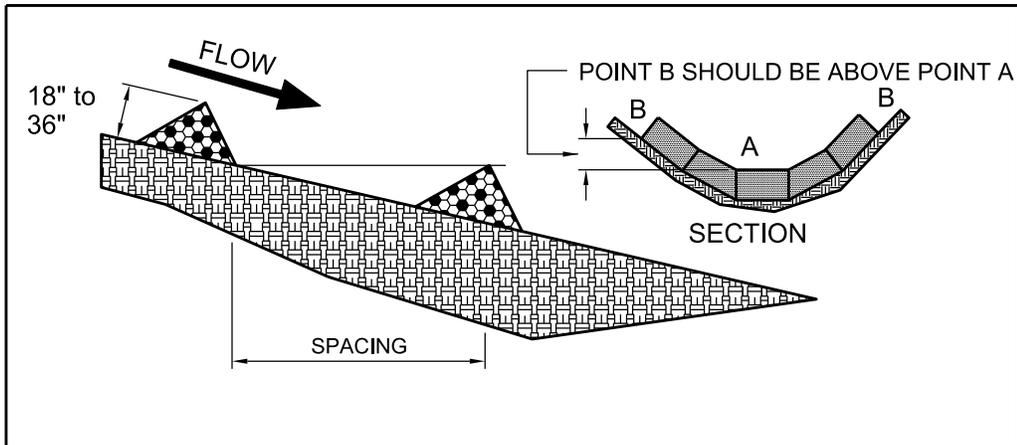
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SEDIMENT BASIN

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CHECK DAMS



DESCRIPTION

Check dams are small barriers consisting of rock, sand bag or earth berms placed across a drainage swale or ditch. They reduce the velocity of small concentrated flows, provide a limited barrier for sediment and help disperse concentrated flows, reducing potential erosion.

PRIMARY USE

Check dams are used for long drainage swales or ditches to reduce erosive velocities. They are typically used in conjunction with other channel protection techniques such as vegetation lining and turf reinforcement mats. Check dams provide limited treatment to sediment-laden flows. They are more useful in reducing flow to acceptable levels for other techniques.

APPLICATIONS

Check dams are typically used early in construction in swales for long linear projects such as roadways. They can also be used in short swales with a steep slope to reduce unacceptable velocities. Check dams shall not be used in live stream channels

DESIGN CRITERIA

- Check dams should be placed at a distance and height to allow small pools to form between each one. Typically, dam height should be between 18" and 36". Dams should be spaced such that the top of the downstream dam should be at the same elevation as the toe of the upstream dam.
- Major flows (greater than 2 year design storm) must pass the check dam without causing excessive upstream flooding.
- Check dams should be used in conjunction with other sediment reduction techniques prior to releasing flow offsite.
- Use geotextile filter fabric under check dams exceeding 18 inches in height. The fabric shall meet the material specified for the Stone Outlet Sediment Trap, S-5.

Rock Check Dams

- Stone shall be well graded with size range from 1-1/2 to 3-1/2 inches in diameter depending on expected flows.
- Rock check dams should be triangular in cross section with side slopes of 1:1 or flatter on the upstream side and 2:1 or flatter on the downstream side.

Applications

Perimeter Control
Slope Protection

Sediment Trapping
Channel Protection

Temporary Stabilization
Permanent Stabilization
Waste Management
Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.40

S-7

1
3

Scale : N/A Date : 02/21/05
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CHECK DAMS

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CHECK DAMS

Sand Bag Dams

- Sand bag check dams should have a maximum flow through rate of 0.1 cfs per square foot of surface with a minimum top width of 16 inches and bottom width of 48 inches. Bags should be filled with coarse sand, pea gravel, or filter stone that is clean and free of deleterious material.
- Bag length shall be 24-inches to 30-inches, width shall be 16-inches to 18-inches and thickness shall be 6-inches to 8-inches and having an approximate weight of 40-pounds.
- Bag material shall be polypropylene, polyethylene, polyamide or cotton burlap woven fabric, minimum unit weight 4-ounces-per-square-yard, Mullen burst strength exceeding 300-psi as determined by ASTM D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method ,and ultraviolet stability exceeding 70-percent.
- PVC pipes may be installed through the sand bag dam near the top to allow for controlled flow through the dam. Pipe should be schedule 40 or heavier polyvinyl chloride (PVC) having a nominal internal diameter of 4 inches.

LIMITATIONS

Minor ponding will occur upstream of the check dams. For heavy flows or high velocity flows, extensive maintenance or replacement of the dams will be required.

Care must be used when taking out rock check dams in order to remove as much rock as possible. Loose rock can create an extreme hazard during mowing operations once the area has been stabilized.

MAINTENANCE REQUIREMENTS

Check dams should be inspected regularly (at least as often as required by the TPDES Construction General Permit). Silt must be removed when it reaches approximately 1/3 the height of the dam or 12", whichever is less.

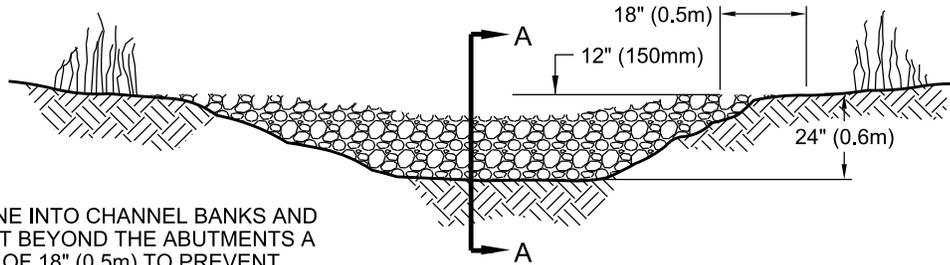
SPECIFICATION

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.9 Rock Dam and Item 201.11 Sand Bag Dam.



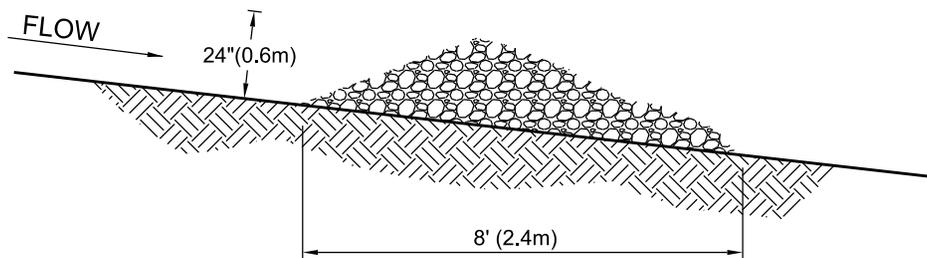
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CHECK DAMS



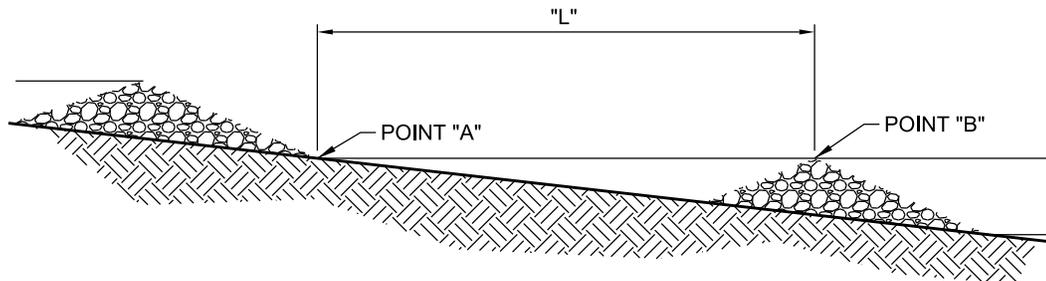
NOTE:
KEY STONE INTO CHANNEL BANKS AND
EXTEND IT BEYOND THE ABUTMENTS A
MINIMUM OF 18" (0.5m) TO PREVENT
FLOW AROUND DAM.

VIEW LOOKING UPSTREAM



SECTION A-A

"L" = the distance such that points "A" and
"B" are of equal elevation.



SPACING BETWEEN CHECK DAMS

SOURCE: STORMWATER MANAGEMENT.
MANUAL FOR WESTERN WASHINGTON



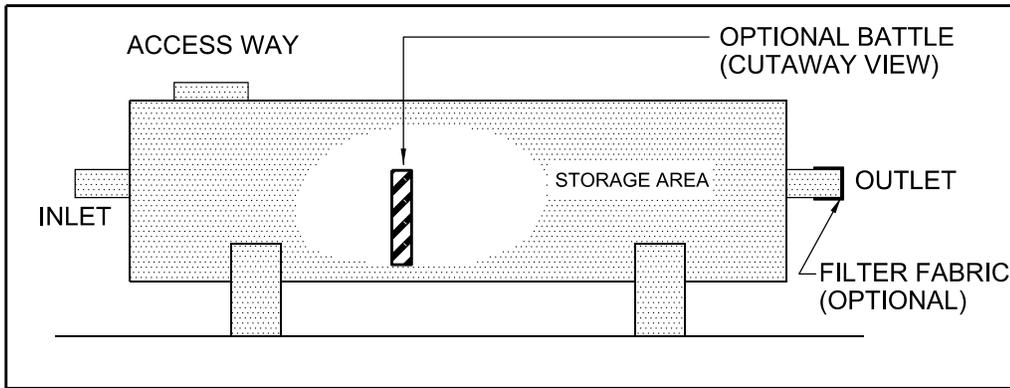
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CHECK DAMS

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TEMPORARY SEDIMENT TANK



DESCRIPTION

A temporary sediment tank (TST) is a large tank used to hold sediment-laden water to provide for sedimentation and filtration. For smaller applications, 55-gallon drums or other watertight container can be used for storage. Water is pumped into the tank where it is detained. If desired an outlet with a geofabric filter can be provided to release the flow after a period of detention.

PRIMARY USE

A TST is typically used at construction sites in urban areas where conventional methods of sediment removal (e. g., sediment traps, and sediment basins) are not practical.

APPLICATIONS

Applications for a TST include utility construction in confined areas (such as a business district or large developed area) or localized construction in which other BMPs are not required such as small, depressed construction areas (tank farms). This includes pumpage from excavation in heavily developed areas, such as a central business district, with flows due to groundwater or runoff entering the trench or excavated area.

DESIGN CRITERIA

- A TST can be used as either a sedimentation or filtration device. If an oil sheen is present in the runoff, additional treatment will be required before release of runoff.
- For use as a small scale sedimentation basin, de-watering discharge is directed into the TST to a level below the tank midpoint and held for a minimum of 2 hours to allow settlement of a majority of the suspended particles. The tank should be designed for a controlled release when the contents of the tank reach a level higher than the midpoint. When sediment occupies 1/3 the capacity of the TST, it should be removed from the tank.
- As a filtration device, a TST is used for collecting de-watering discharge and passing it through a filtered opening at the outlet of the tank to reduce suspended sediment volume. The filter opening in the TST should have an Apparant Opening Size (AOS) (see Silt Fence BMP) of 70 or smaller.

Applications

Perimeter Control
Slope Protection
Sediment Trapping
Channel Protection
Temporary Stabilization
Permanent Stabilization
Waste Management
Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

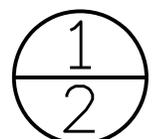
- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=0.70

S-8



Scale : N/A Date : 02/21/05
Design : COG
Drawn : COG
Dwg. File : ERO_023.DWG
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**TEMPORARY SEDIMENT
TANK**

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TEMPORARY SEDIMENT TANK

LIMITATIONS

This is a specialized technique for the situations listed. It is not cost effective for normal sediment removal conditions.

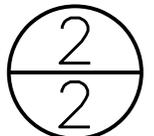
The use of a temporary sediment tank is limited by the capacity of the tank, the time required for settlement of suspended material, and disposal of the water and the sediment.

MAINTENANCE REQUIREMENTS

Sediment tanks should be inspected regularly (at least as often as required by the TPDES Construction General Permit). The tank should be cleaned out when it becomes 1/3 full of sediment.

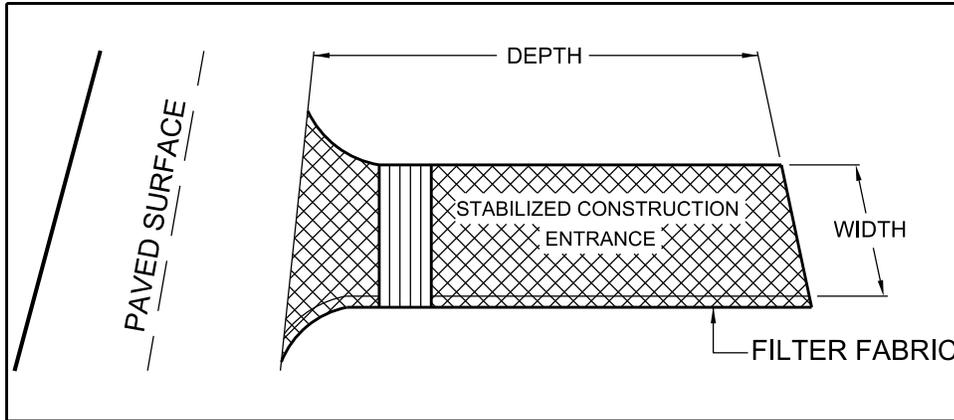
SPECIFICATION

No specification for construction of this item is currently available in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments.



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STABILIZED CONSTRUCTION ENTRANCE



DESCRIPTION

A stabilized construction entrance consists of a pad consisting of crushed stone, recycled concrete or other rock like material on top of geotextile filter cloth to facilitate the removal of sediment and other debris from construction equipment prior to exiting the construction site. This directly addresses the problem of silt and mud deposition in roadways used for construction site access. For added effectiveness, a wash rack area can be incorporated into the design to further reduce sediment tracking (See Wheel Wash, Fact Sheet S-10).

PRIMARY USE

Stabilized construction entrances are used primarily for sites in which significant truck traffic occurs on a daily basis. It reduces the need to remove sediment from streets. If used properly, it also directs the majority of traffic to a single location, reducing the number and quantity of disturbed areas on the site and providing protection for other structural controls through traffic control.

APPLICATIONS

Stabilized construction entrances are a required part of the erosion control plan for all site developments larger than one acre and a recommended practice for all construction sites. If possible, controlled entrances should be incorporated into small lot construction due to the large percentage of disturbed area on the site and the high potential for offsite tracking of silt and mud.

DESIGN CRITERIA

- Stabilized construction entrances are to be constructed such that drainage across the entrance is directed to a controlled, stabilized outlet on site with provisions for storage, proper filtration, and removal of wash water.
- The entrance must be sloped away from the paved surface so that storm water is not allowed to leave the site onto roadways.
- Minimum width of entrance shall be 15 feet.
- Stone shall be placed in a layer of at least 12-inches thickness. The stone shall be a minimum of 3 to 5 inch coarse aggregate.
- Prevent shortcutting of the full length of the construction entrance by installing barriers as necessary.

Applications

Perimeter Control
Slope Protection
Sediment Trapping
Channel Protection

Temporary Stabilization

Permanent Stabilization

Waste Management

Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe = N/A

S-9

1/3

Scale : N/A Date : 02/21/05
Design : COG
Drawn : COG
Dwg. File : ERO_024.DWG
Project No. : STANDARD-DETAILS


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**STABILIZED CONSTRUCTION
ENTRANCE**

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STABILIZED CONSTRUCTION ENTRANCE

- The geotextile fabric must meet the following minimum criteria:
 - Tensile Strength, ASTM D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles, 300-lbs.
 - Puncture Strength, ASTM D4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products, 120-lbs.
 - Mullen Burst Rating, ASTM D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method, 600-psi.
 - Apparent Opening Size, ASTM D4751 Test Method for Determining Apparent Opening Size of a Geotextile, U.S. Sieve No. 40 (max).
- When necessary, vehicles must be cleaned to remove sediment prior to entrance onto paved roads, streets, or parking lots. When washing is required, it shall be done on a constructed wheel wash facility that drains into an approved sediment trap or sediment basin or other sedimentation/filtration device.
- Minimum dimensions for the entrance shall be as follows:

Tract Area	Avg. Tract Depth	Min. Width of Entrance	Min. Depth of Entrance
< 1 Acre	100 feet	15 feet	20 feet
< 5 Acres	200 feet	20 feet	50 feet
> 5 Acres	> 200 feet	25 feet	75-100 feet

LIMITATIONS

Selection of the construction entrance location is critical. To be effective, it must be used exclusively.

Stabilized entrances are rather expensive considering that it must be installed in combination with one or more other sediment control techniques, but it may be cost effective compared to labor-intensive street cleaning.

MAINTENANCE REQUIREMENTS

Construction entrances should be inspected regularly (at least as often as required by the TPDES Construction General Permit). When sediment has substantially clogged the void area between the rocks, the aggregate mat must be washed down or replaced. Periodic re-grading and top dressing with additional stone must be done to keep the efficiency of the entrance from diminishing.

If the stabilized construction entrance is not effectively removing sediment from wheels then a wheel wash should be considered.

SPECIFICATION

Specifications for construction of this item may be found in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments, Section 201.10 Stabilized Construction Entrance.

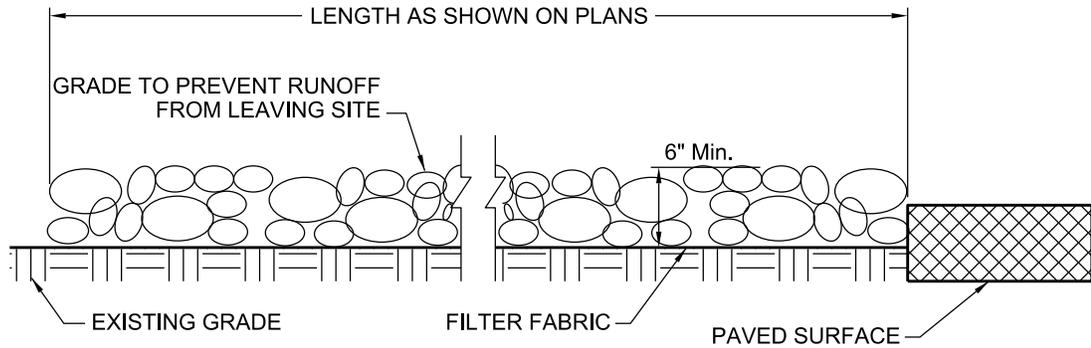


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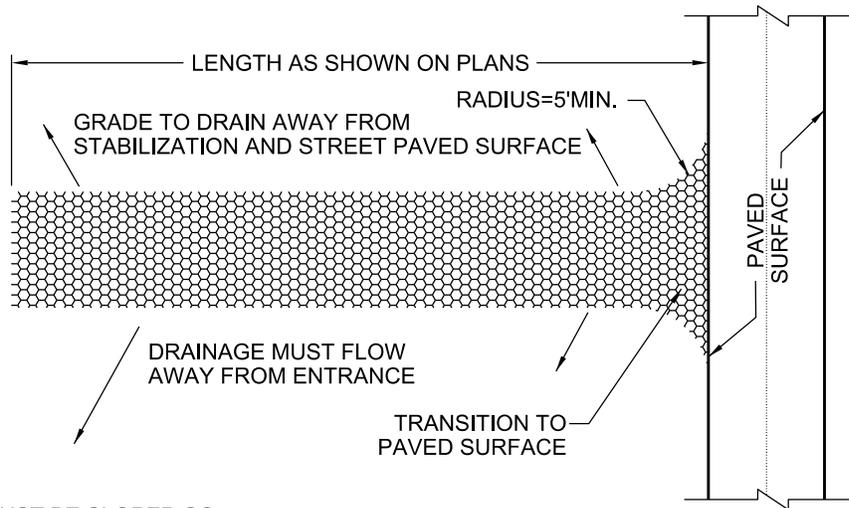


STABILIZED CONSTRUCTION ENTRANCE

STABILIZED CONSTRUCTION ENTRANCE



PROFILE VIEW



ENTRANCE MUST BE SLOPED SO THAT STORM WATER IS NOT ALLOWED TO LEAVE THE SITE AND ENTER ROADWAYS.

PLAN VIEW

3
3

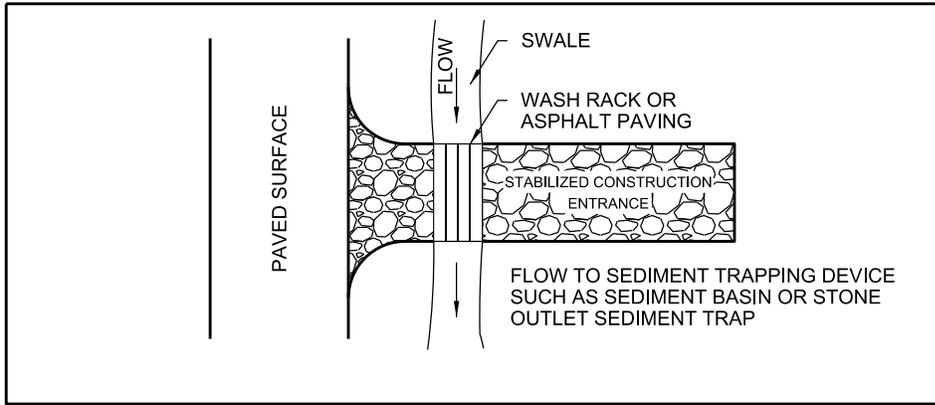
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 ENTRANCE**

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WHEEL WASH



DESCRIPTION

The wheel wash is used in conjunction with a stabilized construction entrance to provide an area where truck wheels and undercarriages can be cleaned prior to traversing the stabilized construction entrance and entering the public road system. A wheel wash may consist of an impervious area or a grate over a swale. Wash water from hand held pressure washers or fixed nozzles is collected and drained to a sediment-trapping device such as a stone outlet sediment trap or sediment basin to provide for removal of sediment prior to discharge.

PRIMARY USE

Wheel washes should be used on large jobs where there is significant truck traffic, on those sites where site conditions cause the stabilized construction entrance to be overloaded with sediment and become ineffective, and in those instances where contaminated solids might be present on site. They provide added protection and reduce the need to remove sediment from streets.

APPLICATIONS

Wheel washes should be considered an ancillary component to the stabilized construction entrance.

DESIGN CRITERIA

- The location should be within the stabilized construction entrance so that the vehicle does not pick up additional sediment load by traversing disturbed areas.
- The size of the wheel wash facility should be sufficient so that all wash water and sediment is collected and drained to a sediment trapping device such as a sediment basin or stone outlet sediment trap.
- Suggested designs:
 - 4-inch thick asphalt pavement on an 8-inch base of crushed rock graded so that wash water drains to a swale; or
 - grate suitably designed to support construction vehicles installed over a swale.
- The facility should be designed so that it can be cleaned between uses.

LIMITATIONS

Sediment trapping BMPs used in conjunction with wheel wash facilities must be carefully designed for the anticipated amount of wash water to be treated.

Applications

- Perimeter Control
- Slope Protection
- Sediment Trapping
- Channel Protection
- Temporary Stabilization
- Permanent Stabilization
- Waste Management
- Housekeeping Practices

Targeted Constituents

- Sediment
- Nutrients Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Construction Wastes

Implementation Requirements

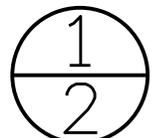
- Capital Costs
- Maintenance
- Training
- Suitability for Slopes > 5%

Legend

- Significant Impact
- Medium Impact
- Low Impact
- ? Unknown or Questionable Impact

Fe=N/A

S-10



Scale : N/A	Date : 02/21/05
Design : COG	
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Dwg. File : ERO_025.DWG	
Project No. : STANDARD-DETAILS	



WHEEL WASH

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WHEEL WASH

MAINTENANCE REQUIREMENTS

wash facilities should be inspected regularly (at least as often as required by the TPDES Construction General Permit). The surface of the wheel wash should be cleaned between vehicles as necessary. Sediment that has accumulated in the wash water sedimentation BMP (sediment trap, sediment basin, etc.) must be removed when it reaches a depth of approximately 1/3 the design depth of the device or 12", whichever is less. The removed sediment shall be stockpiled or redistributed in areas that are protected from erosion.

SPECIFICATION

specification for construction of this item is currently available in the Standard Specifications for Public Works Construction - North Central Texas Council of Governments.



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WHEEL WASH

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