



3.14

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Application of plant residues or other suitable materials to the soil surface. To prevent erosion by protecting the soil surface from raindrop impact and reducing To foster the growth of vegetation by increasing available moisture and providing insulation against extreme heat and cold. Conditions Where Practice Applies Areas which have been permanently seeded (see Std. & Spec. 3.32, PERMANENT SEEDING) should be mulched immediately following seeding.

3.35 3.35 Application: Mulch materials shall be spread uniformly, by hand or machine. When spreading straw mulch by hand, divide the area to be mulched into approximately 1,000 sq. ft. sections and place 70-90 lbs. (1½ to 2 bales) of straw in each section to facilitate Mulch Anchoring: Straw mulch must be anchored immediately after spreading to prevent displacement. Other organic mulches listed in Table 3.35-A do not require anchoring. The following methods of anchoring straw may be used: Mulch anchoring tool (often referred to as a Krimper or Krimper Tool): This is a tractor-drawn implement designed to punch mulch into the soil surface. This method provides good erosion control with straw. It is limited to use on slopes no steeper than 3:1, where equipment can operate safely. Machinery shall be operated on the Fiber Mulch: A very common practice with widespread use today. Apply fiber mulch by means of a hydroseeder at a rate of 500-750 lbs./acre over top of straw mulch or hay. It has an added benefit of providing additional mulch to the newly Liquid mulch binders: Application of liquid mulch binders and tackifiers should be heaviest at edges of areas and at crests of ridges and banks, to prevent displacement.

The remainder of the area should have binder applied uniformly. Binders may be applied after mulch is spread or may be sprayed into the mulch as it is being blown The following types of binders may be used: a. Synthetic binders - Formulated binders or organically formulated products may be used as recommended by the manufacturer to anchor

\* b. Asphalt - Any type of asphalt thin enough to be blown from spray equipment is satisfactory. Recommended for use are rapid curing (RC-70, RC-250, RC-800), medium curing (MC-250, MC-800) and emulsified asphalt (SS-1, CSS-1, CMS-2, MS-2, RS-1, RS-2, CRS-1, and

Apply asphalt at 0.10 gallon per square yard (10 gal./1000 sq. ft. or 430 gal./acre). Do not use heavier applications as it may cause the straw to "perch" over rills. All asphalt designations are from the Asphalt

Institute Specifications. This particular method is not used as commonly today as it once was in the past. The development of hydraulic seeding equipment promoted the industry

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to turn to synthetic or organically based binders and tackifiers. When this method is used, environmental concerns should be addressed to ensure that petroleum-based products do not enter valuable water supplies. Avoid applications into waterways or channels.

Mulch nettings: Lightweight plastic, cotton, or paper nets may be stapled over the mulch according to manufacturer's recommendations.

Peg and twine: Because it is labor-intensive, this method is feasible only in small areas where other methods cannot be used. Drive 8- to 10-inch wooden pegs to within 3 inches of the soil surface, every 4 feet in all directions. Stakes may be driven before or after straw is spread. Secure mulch by stretching twine between pegs in a criss-cross-within-a square pattern. Turn twine 2 or more times around

Chemical Mulches

Chemical mulches\* may be used alone only in the following situations: Where no other mulching material is available. In conjunction with temporary seeding during the times when mulch is not

required for that practice. From March 15 to May 1 and August 15 to September 30, provided that they are used on areas with slopes no steeper than 4:1, which have been roughened in accordance with SURFACE ROUGHENING, Std. & Spec. 3.29. If rill

erosion occurs, another mulch material shall be applied immediately. Chemical mulches may be used to bind other mulches or with fiber mulch in a hydroseeded slurry at any time. Manufacturer's recommendations for application of chemical mulches shall be followed.

All mulches and soil coverings should be inspected periodically (particularly after rainstorms) to check for crosion. Where crosion is observed in mulched areas, additional mulch should be applied. Nets and mats should be inspected after rainstorms for dislocation or failure. If washouts or breakage occur, re-install netting or matting as necessary after repairing damage to the slope or ditch. Inspections should take place up until grasses are firmly established. Where mulch is used in conjunction with ornamental plantings, inspect periodically throughout the year to determine if mulch is maintaining coverage of the soil surface; repair as needed.

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of sediment removed from the basin. Possible alternatives are the use of the material in fill

Sediment basin plans shall indicate the final disposition of the sediment basin after the

upstream drainage area is stabilized. The plans shall include methods for the removal of

excess water lying over the sediment, stabilization of the basin site, and the disposal of any

excess material. Where the sediment basin has been designed as a permanent stormwater

management basin, plans should also address the steps necessary for the conversion from

Sediment basins can be attractive to children and can be dangerous. They should, therefore,

be fenced or otherwise made inaccessible to persons or animals unless this is deemed

unnecessary by the plan approving authority due to the remoteness of the site or other

circumstances. Strategically placed signs around the impoundment reading "DANGER-QUICKSAND" should also be installed. In any case, local ordinances and regulations

regarding health and safety must be adhered to (see Std. & Spec. 3.01, SAFETY FENCE).

Construction Specifications

Areas under the embankment or any structural works related to the basin shall be cleared,

grubbed, and stripped of topsoil to remove trees, vegetation, roots, or other objectionable

material. In order to facilitate cleanout and restoration, the area of most frequent inundation (measured from the top of the principal spillway) will be cleared of all brush and

For earth-fill embankments, a cutoff trench shall be excavated along the centerline of the

dam. The trench must extend at least 1 foot into a stable, impervious layer of soil and have a minimum depth of 2 feet. The cutoff trench shall extend up both abutments to the riser

crest elevation. The minimum bottom width shall be 4 feet, but also must be wide enough to permit operation of compaction equipment. The side slopes shall be no steeper than 1:

Compaction requirements shall be the same as those for the embankment. The trench shall

The fill material shall be taken from approved borrow areas. It shall be clean mineral soil,

free of roots, woody vegetation, stumps, sod, oversized stones, rocks, or other perishable or

objectionable material. The material selected must have enough strength for the dam to

be drained during the backfilling/compacting operations.

areas on-site or removal to an approved off-site location.

Site Preparation

Cutoff Trench

rediment basin to a permanent detention or retention facility.

Corn Stalks - These should be shredded into 4- to 6-inch lengths. Stalks decompose slowly and are resistant to displacement. Wood Chips - Suitable for areas that will not be closely mowed, and around ornamental

Hay - May be used in lieu of straw where volunteers will not present a problem, and may

be spread by hand or machine. Hay can be windblown and must also be anchored or tacked

plantings. Chips decompose slowly and do not require tacking. They must be treated with 12 pounds of nitrogen per ton to prevent nutrient deficiency in plants; however, can be a very inexpensive mulch if chips are obtained from trees cleared on the site. Bark Chips, Shredded Bark - These are by-products of timber processing which are used in

landscaped plantings. Bark is also a suitable mulch for areas planted to grasses and not closely mowed. It may be applied by hand or mechanically and is not usually toxic to grasses or legumes; additional nitrogen fertilizer is not required.

Fiber Mulch - Used in hydroseeding operations and applied as part of the slurry. It creates the best seed-soil contact when applied over top of (as a separate operation) newly seeded areas. These fibers do not require tacking, although tacking agents or binders are sometimes used in conjunction with the application of fiber mulch. This form of mulch does not provide sufficient protection to highly erodible soils. Additionally, fiber mulch will not be considered adequate mulch when used during the dry summer months or when used for late fall mulch cover. Use straw mulch during these periods. Fiber mulch may be used to tack (anchor) straw mulch. This treatment is well suited for steep slopes, critical areas, and

There are other organic materials which make excellent mulches but are only available locally or seasonally. Creative use of these materials can reduce costs.

Chemical Mulches and Soil Binders

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Plate 3.14-3

RISER PIPE BASE CONDITIONS

Anti-seep collars shall be used on the barrel of the principal spillway within the normal

saturation zone of the embankment to increase the seepage length by at least 10%, if either

2. The embankment has a low silt-clay content (Unified Soil Classes SM or GM) and

The anti-seep collars shall be installed within the saturated zone. The maximum spacing between collars shall be 14 times the projection of the collars above the barrel. Collar

shall not be closer than 2 feet to a pipe joint. Collars should be placed sufficiently far apart

to allow space for hauling and compacting equipment. Precautions should be taken to

ensure that 95% compaction is achieved around the collars. Connections between the

collars and the barrel shall be watertight. See Plate 3.14-4 and Appendix 3.14-a for details

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Areas which cannot be seeded because of the season should be mulched to provide

some protection to the soil surface. An organic mulch should be used, and the area

then seeded as soon weather or seasonal conditions permit. It is not recommended

that fiber mulch be used alone for this practice; at normal application rates it just

simply does not provide the protection that is achieved using other types of mulch.

Mulch may be used together with plantings of trees, shrubs, or certain ground covers which do not provide adequate soil stabilization by themselves.

Mulch shall be used in conjunction with temporary seeding operations as specified

Mulches are applied to the soil surface to conserve a desirable soil property or to promote

plant growth. A surface mulch is one of the most effective means of controlling runoff and

Mulches can increase the infiltration rate of the soil, reduce soil moisture loss by

evaporation, prevent crusting and sealing of the soil surface, modify soil temperatures, and provide a suitable microclimate for seed germination.

Organic mulch materials, such as straw, wood chips, bark, and fiber mulch have been found

Chemical soil stabilizers or soil binders should not be used alone for mulch. These

A variety of manufactured SOIL STABILIZATION BLANKETS AND MATTING (see Std.

& Spec. 3.36) have been developed for erosion control in recent years. Some of these

products can be used as mulches, particularly in critical areas such as waterways. They also

The choice of materials for mulching will be based on the type of soil to be protected, site

conditions, season and economics. It is especially important to mulch liberally in mid-

Straw - The mulch most commonly used in conjunction with seeding. The straw should

come from wheat or oats (free of troublesome weed seeds) and may be spread by hand or machine. Straw can be windblown and must be anchored down by an acceptable method.

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materials are useful to bind organic mulches together to prevent displacement.

summer and prior to winter, and on cut slopes and southern slope exposures.

may be used to hold other mulches to the soil surface.

in TEMPORARY SEEDING, Std. & Spec. 3.31.

TYPICAL STEEL BASE

TYPICAL CONCRETE BASE

of the following two conditions is met:

1. The settled height of the embankment exceeds 10 feet.

Source: Va. DSWC

Anti-Seep Collars

and design procedure.

erosion on disturbed land.

to be the most effective

A wide range of synthetic, spray-on materials are marketed to stabilize and protect the soil surface. These are emulsions or dispersions of vinyl compounds, rubber or other substances which are mixed with water and applied to the soil. They may be used alone in some cases as temporary stabilizers, or in conjunction with fiber mulches or straw.

When used alone, chemical mulches do not have the capability to insulate the soil or retain soil moisture that organic mulches have. This soil protection is also easily damaged by traffic. Application of these mulches is usually more expensive than organic mulching, and the mulches decompose in 60-90 days.

Field experience has shown that plastic netting, when used alone, does not retain soil moisture or modify soil temperature. In some cases it may stabilize the soil surface while

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STD & SPEC 3.09 TEMPORARY DIVERSION DIKE

A temporary ridge of compacted soil constructed at the top or base of a sloping disturbed

 To divert storm runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet.

To divert sediment-laden runoff from a disturbed area to a sediment-trapping facility such as a sediment trap or sediment basin.

Conditions Where Practice Applies

(DD)

Wherever stormwater runoff must be temporarily diverted to protect disturbed areas and slopes or retain sediment on site during construction. These structures generally have a life expectancy of 18 months or less, which can be prolonged with proper maintenance.

percolation of water through the dam. Fill containing particles ranging from small gravel or coarse sand to fine sand and clay in desired proportion is appropriate. Any embankment material should contain approximately 20% clay particles by weight. Using the Unified Soil Classification System, SC (clayey sand), GC (clayey gravel) and CL ("low liquid limit" clay) are among the preferred types of embankment soils. Areas on which fill is to be placed shall be scarified prior to placement of fill. The fill material should contain the proper amount of moisture to ensure that 95% compaction will be achieved. Fill material will be placed in 6-inch continuous layers over the entire length of the fill. Compaction shall be obtained by routing the hauling equipment over the fill so that the entire surface of the fill is transversed by at least one wheel or tread track of the equipment, or by using a compactor. Special care shall be taken in compacting around the anti-seep collars (compact by hand, if necessary) to avoid damage and achieve desired compaction. The embankment

remain stable and be tight enough, when properly compacted, to prevent excessive

shall be constructed to an elevation 10% higher than the design height to allow for settlement if compaction is obtained with hauling equipment. If compactors are used for compaction, the overbuild may be reduced to not less than 5%.

The riser of the principal spillway shall be securely attached to the barrel by a watertight connection. The barrel and riser shall be placed on a firmly compacted soil foundation. The base of the riser shall be firmly anchored according to design criteria to prevent its floating. Pervious materials such as sand, gravel, or crushed stone shall not be used as backfill around the barrel or anti-seep collars. Special care shall be taken in compacting around the anti-seep collars (compact by hand, if necessary). Fill material shall be placed around the pipe in 4-inch layers and compacted until 95% compaction is achieved. A minimum of two feet of fill shall be hand-compacted over the barrel before crossing it with construction equipment.

Emergency Spillway Vegetative emergency spillways shall not be constructed over fill material. Design elevations, widths, entrance and exit channel slopes are critical to the successful operation of the spillway and should be adhered to closely during construction.

The embankment and emergency spillway of the sediment basin shall be stabilized with temporary or permanent vegetation immediately after installation of the basin (see TEMPORARY SEEDING, Std. & Spec. 3.31 or PERMANENT SEEDING, Std. & Spec.

Erosion and Sediment Control

The construction of the sediment basin shall be carried out in a manner such that it does not result in sediment problems downstream.

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grasses are being established, but is primarily used in grassed waterways and on slopes to hold straw or similar mulch in place.

Jute mesh and other soil stabilization blankets are good choices for mulching on difficult slopes and in minor drainage swales. Most of the soil stabilization mattings (used to create a permanent matrix for root growth within the soil) must receive mulching in order to properly stabilize an area. Notably, some manufacturers have recently developed permanent mattings which include self-contained, temporary mulching materials; however, these measures will have to meet the requirements noted in Std. & Spec. 3.36, SOIL STABILIZATION BLANKETS AND MATTING, before they can be recommended for use on steep slopes and in channel flow situations.

The most critical aspect of installing blankets and mats is obtaining firm, continuous contact between the material and the soil. Without such contact, the material may fail and thereby allow erosion to occur. It is important to use an adequate number of staples and make sure the material is installed properly in order to maximize soil protection. These products are discussed in more detail in Std. & Spec. 3.36, SOIL STABILIZATION BLANKETS &

Organic mulches may be used in any area where mulch is required, subject to the restrictions noted in Table 3.35-A.

Materials: Select mulch material based on site requirements, availability of materials, and availability of labor and equipment. Table 3.35-A lists the most commonly used organic mulches. Other materials, such as peanut hulls and cotton burs, may be used with the permission of the local Plan-Approving Authority.

Prior to mulching: Complete the required grading and install needed sediment control

Lime and fertilizer should be incorporated and surface roughening accomplished as needed. Seed should be applied prior to mulching except in the following cases:

a. Where seed is to be applied as part of a hydroseeder slurry containing fiber Where seed is to be applied following a straw mulch spread during winter

A temporary diversion dike is intended to divert overland sheet flow to a stabilized outlet or a sediment-trapping facility during establishment of permanent stabilization on sloping disturbed areas. When used a the top of a slope, the structure protects exposed slopes by keeping upland runoff away. When used at the base of a slope, the structure protects adjacent and downstream areas by diverting sediment-laden runoff to a sediment trapping

As per M.S. #5, it is very important that a temporary diversion dike be stabilized immediately following installation with temporary or permanent vegetation to prevent crosion of the dike itself. The gradient of the channel behind the dike is also an important consideration. The dike must have a positive grade to assure drainage, but if the gradien is too great, precautions must be taken to prevent erosion due to high-velocity channel flow behind the dike. The cross-section of the channel which runs behind the dike should be of a parabolic or trapezoidal shape to help inhibit a high velocity of flow which could arise in

This practice is considered an economical one because it uses material available on the site and can usually be constructed with equipment needed for site grading. The useful life of the practice can be extended by stabilizing the dike with vegetation. Diversion dikes are preferable to silt fence because they are more durable, less expensive, and require much less maintenance when constructed properly. Along with a TEMPORARY SEDIMENT TRAP (Std. & Spec. 3.13), they become a logical choice for a control measure once the control limits of the silt fence or straw bale barrier have been exceeded.

Temporary diversion dikes are often used as a perimeter control in association with a sediment trap or a sediment basin, or a series of sediment-trapping facilities, on moderate to large construction sites. If installed properly and in the first phase of grading, maintenance costs are very low. Often, cleaning of sediment-trapping facilities is the only associated maintenance requirement.

As specified herein, this practice is intended to be temporary. However, with more stringent design criteria, it can be made permanent in accordance with DIVERSIONS (Std. & Spec.

Design Criteria No formal design is required. The following criteria shall be met:

Drainage Area The maximum allowable drainage area is 5 acres.

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