Recommended Temporary Erosion and Sediment Control Measures with General Installation Guidelines
**NOTES**

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier. In no case shall the reach length exceed 500'.

2. The last 8'-0' of fence shall be turned up slope.

3. Stake dimensions are nominal.

4. Dimension may vary to fit field condition.

5. Stakes shall be spaced at 8'-0' maximum and shall be positioned on downstream side of fence.

6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.

7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.

8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.

9. Minimum 4 staples per stake. Dimensions shown are typical.

10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.

11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.

12. Joining sections shall not be placed at sump locations.

13. Sandbag rows and layers shall be offset to eliminate gaps.
Additional Information — Silt Fence

- 2" x 4" Wood Post, Standard or Better or Equal Alternate: Steel Fence Post
- Filter fabric material 60" wide rolls. Use staples or wire rings to attach fabric to wire
- 2" x 2" 14 GA wire fabric or equiv.
- Bury bottom of filter material in 8" x 12" trench
- 6' max.

- Filter fabric material
- 2" x 2" 14 GA wire fabric or equiv.
- Fold & set filter fabric into soil
- Backfill and compact the excavated soil in trench and on both sides of filter fence fabric
- 2" x 4" Wood Post
- Alt: Steel fence posts

SILT FENCE
Sediment Basin

FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
SINGLE ORIFICE DESIGN
NOT TO SCALE

NOTE:
This outlet provides no drainage for permanent pool.
FIGURE 2: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE
FIGURE 3: MULTIPLE ORIFICE OUTLET RISER
NOT TO SCALE
NOTE:
Size spillway to convey peak design flow.

TYPICAL OPEN SPILLWAY

Outlet pipe or use alternative open spillway

Excavate, if necessary for storage

Flow

Earth embankment

Outlet protection

All slopes 1:3 (V:H) or flatter

5'-0" Min

12" Min

Watertight connection

Perforate riser

EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP

NOT TO SCALE
**Check Dams**

**ELEVATION**

8" to 12" diameter rock

**TYPICAL ROCK CHECK DAM SECTION**

**ROCK CHECK DAM**

*NOT TO SCALE*

**GRAVEL BAG CHECK DAM ELEVATION**

*NOT TO SCALE*
Note: Install fiber roll along a level contour.

Vertical spacing measured along the face of the slope varies between 10' and 20'.

Install a fiber roll near slope where it transitions into a steeper slope.

TYPICAL FIBER ROLL INSTALLATION

ENTRENCHMENT DETAIL
NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.

2. Place sandbags tightly.

3. Dimension may vary to fit field condition.

4. Sandbag barrier shall be a minimum of 3 bags high.

5. The end of the barrier shall be turned up slope.

6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.

7. Sandbag rows and layers shall be staggered to eliminate gaps.
NOTES
1. Construct the length of each reach so that the change in base
depression along the reach does not exceed 1/2 the height of the
linear barrier. In no case shall the reach length exceed 500'.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embankment spalls against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight
abutment to adjacent bale.
8. Sandbag cross barriers should be a min of 1/2 and a max
of 2/3 the height of the linear barrier.
9. Sandbag rows and layers should be offset to eliminate gaps.

LEGEND
--- DIRECTION OF FLOW
LEGEND

- DIRECTION OF FLOW

END DETAIL

SANDBAG CROSS BARRIER

SECTION B-B

PROFILE

Straw bale barrier

Selback vales (See note 3)

2" x 2" Wood stoke (See note 4)

Wood stump

See note 5

8"

12"

Angle wood stoke toward previously laid bale (See note 7)

Bale binding

See note 6

SANDBAG CROSS BARRIER

Wood stump

See note 5

8"
SE-10  Storm Drain Inlet Protection

**NOTES:**

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

**SECTION A-A**

**PLAN**

DI PROTECTION TYPE 1

NOT TO SCALE
Storm Drain Inlet Protection

Stabilize area and grade uniformly around perimeter.

Geotextile Blanket

Silt fence Per SE-01

Note:
Remove sediment before reaching one-third full.

Section A–A

Concentrated flow

Rock filter (use if flow is concentrated)

Edge of sediment trap

Drain inlet

Geotextile Blanket

Silt fence Per SE-01

Plan

DI PROTECTION TYPE 2
NOT TO SCALE

Notes
1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.
**SE-10 Storm Drain Inlet Protection**

**NOTES:**
1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed.
5. Not applicable in areas with high silts and clays without filter fabric.

**DI PROTECTION TYPE 3**

**NOT TO SCALE**
Concrete block laid lengthwise on sides @ perimeter of opening

Hardware cloth or wire mesh

Runoff with sediment

$12" - 24"$

Overflow

Sediment

Hardware cloth or wire mesh

Curb inlet

Filtered water

Storm Drain Inlet Protection SE-10

DI PROTECTION - TYPE 4
NOT TO SCALE
Straw Mulch

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a stabilizing emulsion. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.

- Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.

- There is a potential for introduction of weed-seed and unwanted plant material.

- When straw blowers are used to apply straw mulch, the treatment areas must be within 45 m (150 ft) of a road or surface capable of supporting trucks.

- Straw mulch applied by hand is more time intensive and potentially costly.

- May have to be removed prior to permanent seeding or soil stabilization.

- “Punching” of straw does not work in sandy soils.
Straw Mulch

Standards and Specifications

- Straw shall be derived from wheat, rice, or barley.
- All materials shall conform to Standard Specifications Sections 20-2.06, 20-2.07 and 20-2.11.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.

Application Procedures

- Apply loose straw at a minimum rate of 3,570 kg/ha (4,000 lb/ac), or as indicated in the project’s special provisions, either by machine or by hand distribution.
- If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- The straw mulch must be evenly distributed on the soil surface.
- Anchor the mulch in place by using a tackifier or by “punching” it into the soil mechanically (incorporating).
- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place.
- A tackifier is typically applied at a rate of 140 kg/ha (125 lb/ac). In windy conditions, the rates are typically 200 kg/ha (178 lb/ac).
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
  - Applying and incorporating straw shall follow the requirements in Standard Specifications Section 20-3.03.
  - On small areas, a spade or shovel can be used.
On slopes with soils, which are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a "crimper."

On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes. Refer to BMP SS-7, "Geotextiles, Plastic Covers and Erosion Control Blankets/Mats."

The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.

Maintain an unbroken, temporary mulched ground cover while DSAs are non-active. Repair any damaged ground cover and re-mulch exposed areas.

Reapplication of straw mulch and tackifier may be required by the Resident Engineer (RE) to maintain effective soil stabilization over disturbed areas and slopes.

After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.
Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

Definition and Purpose
This Best Management Practice (BMP) involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed soil areas and protect soils from erosion by wind or water. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications
These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 1:3 (V:H).
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 1.0 m/s (3.3 ft/s).
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs).
Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

Limitations

- Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels.

- Blankets and mats are generally not suitable for excessively rocky sites, or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).

- Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.

- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.

- Plastic results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.

- The use of plastic shall be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.

- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations; consult the manufacturer for proper selection.

Standards and Specifications

Material Selection

There are many types of erosion control blankets and mats, and selection of the appropriate type shall be based on the specific type of application and site conditions. Selection(s) made by the Contractor must be approved by the Resident Engineer (RE); certification of compliance shall be in accordance with Standard Specifications Section 6-1.07.

Geotextiles

- Material shall be a woven polypropylene fabric with minimum thickness of 1.5 mm (0.06 inch), minimum width of 3.7 m (12 ft) and shall have minimum tensile strength of 0.67 kN (warp) 0.36 kN (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric shall be approximately 0.07 sec\(^{-1}\) in conformance with the requirements in ASTM Designation: D4491. The fabric shall have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface waters under Geotextile. Staples shall be made of 3.05-mm (0.12-inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

- Geotextiles may be reused if, in the opinion of the RE, they are suitable for the use intended.
Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

**Plastic Covers**

- Plastic sheeting shall have a minimum thickness of 6 mil, and shall be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 3 m (10 ft) apart. Seams are typically taped or weighted down their entire length, and there shall be at least a 300 mm to 600 mm (12 to 24 inches) overlap of all seams. Edges shall be embedded a minimum of 150 mm (6 inches) in soil.

- All sheeting shall be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures shall be repaired immediately. If washout or breakages occurs, the material shall be re-installed after repairing the damage to the slope.

**Erosion Control Blankets/Mats**

- Biodegradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. For an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.

  - **Jute** is a natural fiber that is made into a yarn, which is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers’ recommendations.

  - **Excelsior (curled wood fiber)** blanket material shall consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 150 mm (6 inches) or longer. The excelsior blanket shall be of consistent thickness. The wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with a photodegradable extruded plastic mesh. The blanket shall be smolder resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Excelsior blanket shall be furnished in rolled strips, a minimum of 1220 mm (48 inches) wide, and shall have an average weight of 0.5 kg/m² (12 lb/ft²), ±10 percent, at the time of manufacture. Excelsior blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
Straw blanket shall be machine-produced mats of straw with a lightweight biodegradable netting top layer. The straw shall be attached to the netting with biodegradable thread or glue strips. The straw blanket shall be of consistent thickness. The straw shall be evenly distributed over the entire area of the blanket. Straw blanket shall be furnished in rolled strips a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27 kg/m² (6.4 lb/ft²). Straw blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

Wood fiber blanket is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Coconut fiber blanket shall be machine-produced mats of 100% coconut fiber with biodegradable netting on the top and bottom. The coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket shall be of consistent thickness. The coconut fiber shall be evenly distributed over the entire area of the blanket. Coconut fiber blanket shall be furnished in rolled strips with a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27 kg/m² (6.4 lb/ft²). Coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.

Coconut fiber mesh is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Straw coconut fiber blanket shall be machine-produced mats of 70% straw and 30% coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber shall be attached to the netting with biodegradable thread or glue strips. The straw and coconut fiber blanket shall be of consistent thickness. The straw and coconut fiber shall be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket shall be furnished in rolled strips a minimum of 2 m (6.5 ft) wide, a minimum of 25 m (80 ft) long and a minimum of 0.27 kg/m² (6.4 lb/ft²). Straw coconut fiber blankets shall be secured in place with wire staples. Staples shall be made of 3.05-mm (0.12-inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.

- Plastic netting is a lightweight biaxially-oriented netting designed for securing loose mulches like straw to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- Plastic mesh is an open-weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 0.5 cm (0.2 inch). It is used with revegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which shall be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- Synthetic fiber with netting is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be revegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- Bonded synthetic fibers consist of a three-dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90% open area, which facilitates root growth. Its tough root-reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- Combination synthetic and biodegradable RECPs consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high-strength continuous-filament geomatrix or net stitched to the bottom. The material is designed to enhance revegetation. The material is furnished in rolled strips, which shall be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 50 mm (2 in) to 75 mm (3 in) of topsoil.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Anchoring

- U-shaped wire staples, metal geotextile stake pins or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Staples shall be made of 3.05 mm (0.12 inch) steel wire and shall be U-shaped with 200-mm (8-inch) legs and 50-mm (2-inch) crown.
- Metal stake pins shall be 5 mm (0.188 in) diameter steel with a 40 mm (1.5 in) steel washer at the head of the pin.
- Wire staples and metal stakes shall be driven flush to the soil surface.
- All anchors shall be 150 mm (6 in) to 450 mm (18 in) long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.

Installation on Slopes

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 150 mm (6 in) deep by 150 mm (6 in) wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket downslope in the direction of water flow.
Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

- Overlap the edges of adjacent parallel rolls 50 mm (2 in) to 75 mm (3 in) and staple every 1 m (3 ft).

- When blankets must be spliced, place blankets end over end (shingle style) with 150 mm (6 in) overlap. Staple through overlapped area, approximately 300 mm (12 in) apart.

- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.

- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (V:H) to 1:2 (V:H), require a minimum of 2 staples/m² (2 staples/yd²). Moderate slopes, 1:2 (V:H) to 1:3 (V:H), require a minimum of 1½ staples/m² (1 ½ staples/yd²), placing 1 staple/m (1 staple/yd) on centers. Gentle slopes require a minimum of 1 staple/m² (1 staple/yd²).

**Installation in Channels**

Installation shall be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 300 mm (12 in) deep and 150 mm (6 in) wide across the channel at the lower end of the project area.

- Excavate intermittent check slots, 150 mm (6 in) deep and 150 mm (6 in) wide across the channel at 8 m to 10 m (25 ft to 30 ft) intervals along the channels.

- Cut longitudinal channel anchor slots 100 mm (4 in) deep and 100 mm (4 in) wide along each side of the installation to bury edges of matting, whenever possible extend matting 50 mm (2 in) to 75 mm (3 in) above the crest of the channel side slopes.

- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 300 mm (12 in) intervals. Note: matting will initially be upside down in anchor trench.

- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 75 mm (3 in).

- Secure these initial ends of mats with anchors at 300 mm (12 in) intervals, backfill and compact soil.

- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 75 mm (3 in) overlap.
Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 300 mm (12 in) intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.

Alternate method for non-critical installations: Place two rows of anchors on 150 mm (6 in) centers at 8 m (25 ft) to 10 m (30 ft) intervals in lieu of excavated check slots.

Shingle-lap spliced ends by a minimum of 300 mm (12 in) apart on 300 mm (12 in) intervals.

Place edges of outside mats in previously excavated longitudinal slots, anchor using prescribed staple pattern, backfill and compact soil.

Anchor, fill and compact upstream end of mat in a 300 mm (12 in) by 150 mm (6 in) terminal trench.

Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.

Seed and fill turf reinforcement matting with soil, if specified.

**Soil Filling (if specified for turf reinforcement)**

- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes or brooms for fine grading and touch up.
- Smooth out soil filling, just exposing top netting of mat.

**Temporary Soil Stabilization Removal**

- When no longer required for the work, temporary soil stabilization shall become the property of the Contractor. Temporary soil stabilization removed from the site of the work shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 7-1.13. If approved by the RE, the contractor may leave the temporary soil stabilizer in place.
Areas treated with temporary soil stabilization shall be inspected as specified in the special provisions. Areas treated with temporary soil stabilization shall be maintained to provide adequate erosion control. Temporary soil stabilization shall be reapplied or replaced on exposed soils when area becomes exposed or exhibits visible erosion.

- All blankets and mats shall be inspected periodically after installation.

- Installation shall be inspected after significant rain storms to check for erosion and undermining. Any failures shall be repaired immediately.

- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
Typical Installation Detail

ISOMETRIC VIEW

NOTES:
1. Check slots to be constructed per manufacturers specifications.
2. Stoking or stapling layout per manufacturers specifications.
3. Install per manufacturer’s recommendations.
Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

Typical Installation Detail

NOTES:
1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations
Wood Mulching

Definition and Purpose
Wood mulching consist of applying a mixture of shredded wood mulch, bark or compost. Wood mulch is mostly applicable to landscape projects.

The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Appropriate Applications
Wood mulching is considered a temporary soil stabilization (erosion control) alternative in the following situations:

- As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetative cover can be established.

- As short term, non-vegetative ground cover on slopes to reduce rainfall impact, decrease the velocity of sheet flow, settle out sediment and reduce wind erosion.

Limitations
- Wood mulch may introduce unwanted species.

- Shredded wood does not withstand concentrated flows and is prone to sheet erosion.

- Green material has the potential for the presence of unwanted weeds and other plant materials. Delivery system is primarily by manual labor, although pneumatic application equipment is available.
Wood Mulching

Standards and Specifications

**Mulch Selection**
There are many types of mulches, and selection of the appropriate type shall be based on the type of application and site conditions. Prior to use of wood mulches, there shall be concurrence with the District Landscape Architect since some mulch use on construction projects may not be compatible with planned or future projects. Selection of wood mulches by the Contractor shall comply with Standard Specifications Section 20-2.08, and must be approved by the Resident Engineer (RE).

**Application Procedures**
Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a punching-type roller or by track walking. The construction-application procedures for mulches vary significantly depending upon the type of mulching method specified. Two (2) methods are highlighted here:

- **Green Material**: This type of mulch is produced by recycling vegetation trimmings such as grass, shredded shrubs and trees. Methods of application are generally by hand, although pneumatic methods are available. Mulch shall be composted to kill weed seeds.
  - It can be used as a temporary ground cover with or without seeding.
  - The green material shall be evenly distributed on site to a depth of not more than 50 mm (2 in).

- **Shredded Wood**: Suitable for ground cover in ornamental or revegetated plantings.
  - Shredded wood/bark is conditionally suitable; see note under limitations.
  - Shall be distributed by hand (although pneumatic methods may be available).
  - The mulch shall be evenly distributed across the soil surface to a depth of 50 mm (2 in) to 75 mm (3 in).

- Avoid mulch placement onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.

- All material must be removed before re-starting work on the slopes.
Wood Mulching

Maintenance and Inspection

- Regardless of the mulching technique selected, the key consideration in Maintenance and Inspection is that the mulch needs to last long enough to achieve erosion-control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it shall last the length of time the site will remain barren or until final re-grading and revegetation.

- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance shall focus on longevity and integrity of the mulch.
Earth Dikes/Drainage Swales and Lined Ditches

Definition and Purpose

These are structures that intercept, divert and convey surface run-on, generally sheet flow, to prevent erosion.

Appropriate Applications

- Earth dikes/drainage swales and lined ditches may be used to:
  - Convey surface runoff down sloping land.
  - Intercept and divert runoff to avoid sheet flow over sloped surfaces.
  - Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
  - Intercept runoff from paved surfaces.

- Earth dikes/drainage swales and lined ditches also may be used:
  - Below steep grades where runoff begins to concentrate.
  - Along roadways and facility improvements subject to flood drainage.
  - At the top of slopes to divert run-on from adjacent or undisturbed slopes.
  - At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.

- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).
Earth Dikes/Drainage Swales and Lined Ditches

Limitations
- Earth dikes/drainage swales and lined ditches are not suitable as sediment trapping devices.
- May be necessary to use other soil stabilization and sediment controls, such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.

Standards and Specifications
- Care must be applied to correctly size and locate earth dikes, drainage swales and lined ditches. Excessively steep, unlined dikes and swales are subject to erosion and gully formation.
- Conveyances shall be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff from the highway right-of-way onto other property.
- When possible, install and utilize permanent dikes, swales and ditches early in the construction process.
- Provide stabilized outlets. Refer to SS-10, “Outlet Protection/Velocity/Dissipation Devices.”

Maintenance and Inspections
- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, and repair linings and embankments as needed or as directed by the RE.
- Temporary conveyances shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.
Earth Dikes/Drainage Swales
and Lined Ditches

NOTES:
1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade, in conformance with Section 19-5 of the Caltrans Standard Specifications.

TYPICAL DRAINAGE SWALE
NOT TO SCALE

TYPICAL EARTH DIKE
NOT TO SCALE