Erosion Control
## Erosion Control

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Provide necessary excavation at locations where soil conditions require shaping of a ditch to provide a proper type of area for installation of wood excelsior mat for special ditch control.

Ensure ground surface adjacent to any channels is shaped to facilitate natural drainage into the protected area.

Use all excavated material to fill low areas, gullies, backslope scours, and otherwise facilitate the free flow of surface water into the channel as directed by the Engineer. Alignment should be smooth and avoid abrupt changes.

1. Install anchor slot at the beginning (upstream end) of all wood excelsior mat installations.
2. Place staples alternately in rows approximately 24 inches apart. Approximately 30 staples required per square (100 sq. ft.) of wood excelsior mat.
3. Space Check Slots in ditch channel so that one occurs within each 50 feet on slopes of more than 4%.
4. Stagger Junction Slots (end of rolls).
5. Do not use Junction Slots or Check Slots when Wood Excelsior Mat is placed over Turf Reinforced Mat.

Possible Contract Item:
Special Ditch Control, Wood Excelsior Mat

Possible Tabulation:
100-22
Through ditches or borrow areas, construct sod channels at the low point. Use all excavated material to fill low areas to facilitate the free flow of surface water into the channel. Alignment should be smooth and avoid abrupt changes.

Provide necessary excavation at locations where silt conditions require shaping of a ditch to provide a proper type of area for installation of sod for special ditch control. Dispose excavated material in adjacent area as directed by the Engineer.

At locations where erosion has created gullies in ditches or backslopes, fill and compact gullies in lifts not more than 6-inches thick.

Unless specifically required otherwise by the Engineer, install wire stakes or wood stakes. Stagger wire stakes as shown. Minimum 33 stakes per square. Use wood stakes in sod flumes when designated by the Engineer. When directed by the Engineer, longer stakes may be required for certain soil conditions to properly hold sod in place.

Work for providing proper ditches will not be paid for directly but is incidental to other work on the project.

Shaping and grading work necessary to prepare the ground for sodding adjacent to concrete surfaces will not be paid for separately but is incidental to other work on the project. Such grading and shaping may include the removal and disposal of excess earth, as directed by the Engineer, in order to obtain satisfactory drainage and appearance for the finished work.

Sod placement on slopes where excavation is required for proper installation of sod.
The work of providing suitable earth surface for placement of slope protection is incidental to preparation of seedbed.

Ensure that ground surfaces adjacent to any channels are shaped to facilitate natural drainage into the protected area.

Excelsior mat for backslope protection is installed with strips placed approximately perpendicular to roadway. Locations for slope protection are shown on detail plans.

Excelsior mat for foreslope protection is installed with strips placed approximately parallel to roadway. The location, width, and number of strips are specified on project plans.

1. Space top row of staples at 18 inch centers, bottom row at 36 inch centers, and all others at 24 inch centers. Approximately 30 staples required per square (100 sq. ft) of wood excelsior mat.
2. Where erosive gullies have developed in backslope, fill with soil and compact prior to placement of mat.
3. Where excelsior mat is to be placed as Special Ditch Control, install slope protection to facilitate placement of the ditch control as indicated (Alternate B). Where there is no Special Ditch Control, install slope protection as shown (Alternate A).
4. 4 feet unless specified otherwise for foreslope protection.
5. If erosive rill has developed adjacent to shoulder material, fill with suitable soil and compact prior to placement of mat.

Possible Contract Item:
- Slope Protection, Wood Excelsior Mat

Possible Tabulation:
100-22
INSTALL ANCHOR SLOT
- Install anchor slot at the beginning (upstream end) of all mat installations.
- Place staples alternately in rows approximately 24 inches apart. Approximately 30 staples required per square (100 sq. ft.) of each type of mat.
- Stagger Junction Slots.

Possible Contract Items:
Turf Reinforcement Mat

Possible Tabulation:
100-22
Refer to Standard Road Plan EC-104 for the placement of the TRM.

1. Place at same thickness as surrounding area. Refer to T Sheets to determine topsoil thickness for the surrounding area.

Possible Contract Items:
Transition Mat

Possible Tabulation:
100-09
Install all silt fence using a silt fence machine. Use manual (trench) installation if physical conditions prohibit machine installation.

For machine installation, compact by driving over each side of silt fence at least two times with a rubber-tired vehicle.

For manual installation, compact with a mechanical or pneumatic tamper.

1. Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire passing through or encompassing the belt. See attachment to post.

2. For manual installation only, fold engineering fabric along bottom of trench.

3. Embed all posts 28 inches below the ground line.

4. Refer to Tab. 100-17

The contractor has two installation options:

- Place silt fence continuously up to a maximum of 200 feet. For every 200 foot segment of fence placed, flare up the slope on both ends 20 feet of the segment to contain runoff as shown, or
- Place silt fence continuously. Every 200 feet, place a hump that extends 20 feet up the slope to contain runoff as shown.

5. Place silt fence continuously up to a maximum length of 200 feet. For every segment of silt fence that is placed, flare up the slope on both ends 20 feet of the segment to contain runoff as shown.

Refer to Tab. 100-17

Possible Contract Items:
- Silt Fence
- Silt Fence for Ditch Checks

Possible Tabulations:
- 100-17
- 100-18

Modified trench to 10". Added circle notes 13 & 14.
DITCH CHECK - MACHINE INSTALLATION

1. Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire passing through or encompassing the belt. See attachment to post.

2. For manual installation only, fold engineering fabric along bottom of trench.

3. Embed all posts 28 inches below the ground line.

4. Locate posts at toe of foreslope and toe of backslope and space remaining posts equally.

5. Minimum end span (in feet) = 2 X Foreslope (H:V).


7. Refer to Tab. 100-18

DITCH CHECK - MANUAL INSTALLATION

1. Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire passing through or encompassing the belt. See attachment to post.

2. Place engineering fabric (4" x 12"") encompassing the belt. See attachment to post.

3. Place cable ties (50 lb.) or wire passing through or encompassing the belt. See attachment to post.

4. Embed all posts 28 inches below the ground line.

5. Locate posts at toe of foreslope and toe of backslope and space remaining posts equally.

6. Minimum end span (in feet) = 2 X Foreslope (H:V).

7. Minimum end span (in feet) = 2 X Backslope (H:V).

8. Refer to Tab. 100-18

PLAN FOR DITCH CHECK (TYPE 1)

LOCATION STATION

LOCATION STATION

Ditch Check

Foreslope

Backslope

Trench 4" x 12"

Minimum end span (in feet) = 2 X Foreslope (H:V).

Minimum end span (in feet) = 2 X Backslope (H:V).

Refer to Tab. 100-18

Front View

Ditch

Engineering Fabric

1" Steel Fence

Post 4' min.

4" Offset

Bottom of Trench

(Machine Installation)

Bottom of Trench

(Machine Installation)
PLAN FOR SILT DITCH (SHALLOW DITCH SECTION-TYPE 4)

1. Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire passing through or encompassing the belt. See attachment to post.
2. Embed all posts 28 inches below the ground line.
3. Locate posts at toe of foreslope and toe of backslope and space remaining posts equally.
4. Minimum end span (in feet) = 2 x Foreslope (H:V).
5. Place posts shown in Detail 'A' to transition from transverse to parallel installation. Place one post at the back slope intercept and the other beyond the intercept.
6. Refer to Tab. 100-18
Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire passing through or encompassing the belt. See attachment to post.

Embed all posts 28 inches below the ground line.

Minimum end span (in feet) = 2 X Foreslope (H:V).

Locate posts at toe of foreslope. Locate posts at 4 foot spacing.

Place posts as shown in Detail 'B' to transition from transverse to parallel installation. The parallel portion of the installation should approximately parallel the intercept of the foreslope.

Refer to Tab. 100-18.
Keep silt curtain as close to work area as possible.

Depth of curtain is the dimension of the curtain fabric extending below the floatation, i.e. hanging in the water.

Install according to Hanging Installation unless specified otherwise.

Possible Contract Items:
- Clean-out of Floating Silt Curtain
- Floating Silt Curtain (Containment)
- Floating Silt Curtain (Hanging)
- Maintenance of Floating Silt Curtain

Possible Tabulation:
100-10
When Containment Installation is specified, it will be in combination with a Hanging installation that is paid for separately.

LEGEND

- Carrier Float
- Buoy
- Undisturbed Vegetation
- Disturbed Soil
- Water Surface

Plan:
- Stream Crossing or Causeway (with pipe)
- Causeway or Pad

Profile:
- Anchor Point
- Anchor Cable
- Curtain Weight
- Steel Tension Cable
- Variable Length Curtain Fabric

Section A-A:
- Hanging Installation
- Containment Installation
- Anchor Point
- Water Body
- Pipe

EC-202
STANDARD ROAD PLAN
FLOATING SILT CURTAIN
**Perimeter Control**

- **Contour Lines**
- **Flow**
- **Wood Stake**

**Legend**

**PERIMETER CONTROL**

1. **Overlap joints per Detail 'A':** Turn the lower 10 feet of each run up the slope to help contain runoff. When placed such that runoff is conveyed along the device, additional run-up and/or means may be required to reduce erosion along the device. Run-ups will be included in the installation length.

2. **Extra material required to install overlaps will not be included in the installation length.**

3. **Install downslope stakes at 4 foot maximum spacing.**

4. **Upslope stakes spaced at ends and middle of device. Use minimum actual stake size 3/4" x 3/4" wood stakes.**

5. **All stakes to be placed at approximately 45 degree angle to ground.**

6. **Install staples every 2 feet on upslope side.**

**Possible Contract Item:**
- Perimeter and Slope Sediment Control Device
- Ditch Check Sediment Control Device

**Possible Tabulation:**
- EC-204

**Not intended for use in perennial or intermittent streams.**

Fill and compact rills and gullies (see Detail 'B') prior to placing Perimeter and Slope Sediment Control Device. Ensure ground surface is smooth in order to provide continuous contact with Perimeter and Slope Sediment Control Device. Minor ground shaping may be required. Filling and compacting rills and gullies, and minor ground shaping, is incidental to Perimeter and Slope Sediment Control Device.

**Possible Tabulation:**
- 100-19

**Possible Contract Item:**
- Perimeter and Slope Sediment Control Device
- Ditch Check Sediment Control Device

Fill and compact rills and gullies prior to placing Perimeter and Slope Sediment Control Device. Minor shaping of rills and gullies, and minor ground shaping, is incidental to Perimeter and Slope Sediment Control Device.

**Perimeter Control Along Curbing**

**Inlet Perimeter Protection**

**Detail 'A':**

- Perimeter and Slope Sediment Control Device
- Run-ups and/or means may be required to reduce erosion along the device. Run-ups will be included in the installation length.

- Extra material required to install overlaps will not be included in the installation length.

- Install downslope stakes at 4 foot maximum spacing. Use minimum actual stake size 3/4" x 3/4" wood stakes.

- All stakes to be placed at approximately 45 degree angle to ground.

- Install staples every 2 feet on upslope side.

**Detail 'B':**

- Perimeter and Slope Sediment Control Device
- Fill and compact rills and gullies prior to placing Perimeter and Slope Sediment Control Device.
Install downslope stakes at 4 foot maximum spacing. Upslope stakes spaced at ends and middle of device. Use minimum actual stake size 3/4" x 3/4" wood stakes. Install staples every 2 feet on upslope side.

Install Slope Protection perpendicular to slope (parallel to contours). Overlap joints per Detail 'A'. Run the last 10 feet of each device up the slope to prevent flow runaround. Run-ups will be included in the installation length.

Install staples every 2 feet on upslope side.

LEGEND

- Contour Lines
- Flow
- Wood Stake
install downslope stakes at 2 foot maximum spacing. upslope stakes spaced at ends and middle of device. use minimum actual stake size 3/4" x 3/4" wood stakes.

install ditch protection perpendicular to ditch. overlap joints per detail 'a'.

install staples every 1 foot on upslope side.

install staples every 1 foot on upslope side.

install staples every 1 foot on upslope side.
Reconstructed Flow Line

SECTION A-A

PLAN

EXCAVATION SECTION

DITCH CHECK SECTION

LONGITUDINAL SECTION AT CENTERLINE OF DITCH

TYPE 1
(Rock Ditch Check)

ISOMETRIC VIEW

SECTION A-A

TYPE 2
(Rock Ditch)

TYPICAL SECTION

LOWER ANCHOR SLOT

COMPACTED EARTH

ENGINEERING FABRIC

STAPLES AT 12" CENTERS

UPPER ANCHOR SLOT

TYPE 3
(Rock Flume)

STAPLE

(No. 11 wire)

SECTION B-B

ROCK EROSION CONTROL
(REC)

Class 10 excavation required to install Rock Erosion Control is incidental and will not be paid for separately.

Use fabric for Embankment Erosion Control complying with Section 4396 of the Standard Specifications.

Possible Contract Items:
- Erosion Stone
- Class E Revetment
- Engineering Fabric

Possible Tabulation:

100-23
Center splash basin directly under bridge drain.

Staples at 12 inch centers.

Splash Basin Under Bridge Drain

Splash Basin

Splash Basin

Bridgeslope

Groundline

Class E Revetment

Erosion Stone or Fabric

Engineering

4

1

W

L

Splash Basin

Ditch

Foreslope

Foreslope

Culvert

Class E Revetment

Erosion Stone or Fabric

4

1

W

L

Splash Basin

Ditch

Foreslope

Foreslope

Culvert

Class E Revetment

Erosion Stone or Fabric

Type 4
(Rock Splash Basin)

Anchor Slot

(Armor Plate)

Existing Backslope

Staple

(No. 11 wire)

Staple

(No. 11 wire)

2''

8''

6'' min. Lap

6'' min.

Erosion Stone or Class E Revetment

Erosion Stone or Class E Revetment

6'' min.

L

Earth Compacted Fabric

6''

1'-0'' centers

Staples at 6'' centers.

Type 5
(Rock Slope Protection)

Anchor Slot

STAPLE

(No. 11 wire)

SECTION A-A

EC-301

REVISION

STANDARD ROAD PLAN

REVISIONS:

Added note referencing 4196

Approved by Design Methods Engineer

ROCK EROSION CONTROL
(REC)
Use Class D Revetment to construct Rock Check Dam.

Use fabric for Embankment Erosion Control complying with Section 4196 of the Standard Specifications.

Possible Contract Items:
- Rock Check Dam
- Maintenance of Rock Check Dam
- Removal of Rock Check Dam

Possible Tabulation:
- 103-32

Design Engineer Information

Use fabric for Embankment Erosion Control complying with Section 4196 of the Standard Specifications.
Obtain the Engineer's approval for location of stabilized entrances prior to constructing.


2. Use aggregate meeting Gradation No. 13a of Section 4109 of the Standard Specifications.

3. Depth may need to be increased depending on the weight of contractor vehicles and equipment.
Refer to detail project plans for additional information regarding planting location and layout.

When no specific requirement is indicated, complete planting as directed by the Engineer.

Till entire area to be mulched with a rotary tiller or other method approved by the Engineer.

Rake smooth the entire area to be mulched and ensure it is free of vegetation, debris, clogs, and rocks. Form a 2-inch deep basin around plants to retain water. Plant plants at the same depth as they were in the nursery.

Follow mulch material and depth as designated on the plans. Pull mulch back ¼ inch to 1 inch from the plants to allow air circulation at a uniform depth to reflect the 2-inch basin.

Pruning consists of removing dead, broken, and irregular branches only. Do not prune the tops of plants unless it is to remove dead or broken material.

Use steel posts complying with Article 4154.09 of the Standard Specifications for staking. For trees 5 feet in height and less use posts 5 feet in length. For trees taller than 5 feet use posts 7 feet in length.
SEEDING IN RURAL AREAS
1. Ensure Riser Pipe remains vertical.
2. Dimensions shown are minimums.
3. When Temporary Sediment Control Basin is removed, if basin has not silted in to designed ditch grade, use topsoil to bring up to designed ditch grade.

Temporary Sediment Control Basin:
- Maintenance of Temporary Sediment Control Basin
- Removal of Temporary Sediment Control Basin

Possible Contract Items:
- Temporary Sediment Control Basin
- Erosion Stone
- Pipe
- Excavated Earth Material

Possible Tabulation:
100-33

Excavated Earth Material
Pipe
Erosion Stone

Detail "A"


**Possible Contract Items:**
- Open-throat Curb Intake Sediment Filter
- Maintenance of Open-throat Curb Intake Sediment Filter
- Removal of Open-throat Curb Intake Sediment Filter

**Possible Tabulation:**

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**OPEN-THROAT CURB INTAKE SEDIMENT FILTER**

1. Trim frame as needed to tightly fit in the intake throat. Overlap fabric a minimum of 3 inches and secure fasteners.
2. Securely attach filter fabric to the wire frame leaving an overflow opening above the filter fabric.
3. Woven material meeting the requirements of Table 4196.01-1 of the Standard Specifications, except a maximum apparent opening size US Sieve No. 10 and a minimum flow rate of 145 gallons per minute per square foot.
4. Insert sediment filter to create a compression fit in the intake throat. If overflow opening is not present after inserting filter, trim filter fabric so opening is present.

**Design Information**
- Sediment Filter
- 2" x 4" Welded Wire Frame
- Overflow Opening
- Filter Fabric

**Sediment Filter Cross Section**

**Sediment Filter Placement**

Remove sediment filter upon stabilization of sediment sources.