Appendix G

Minnesota Energy Resources Corporation Best Management Practices

Includes the following examples:

G-1 Dewatering

G-2 Erosion Mats

G-3 Sediment Control

G-4 Restoration - Mulching, Seeding and Sod

G-5 Frac Out Response plan and Report Form

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Example Dewatering

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Gas Work Practice

WP 1365-WPS: Dewatering

Revision 1.0
4/29/2016

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1.0 PURPOSE

The purpose of this work practice is to determine appropriate methods and means to remove sediment from water generated during dewatering activities prior to discharging off-site or to waters of the state.

2.0 SCOPE AND APPLICABILITY

If the project is over one (1) acre and has a WPDES Storm Water permit, then dewatering methods will be identified in the site specific erosion control plan and the discharge is covered under that permit. Practices identified in this work practice shall be deemed to meet the dewatering performance standard to prevent the discharge of sediment to the maximum extent practicable (MEP) as defined in NR 151.11(6)(c) for storm water runoff management from construction sites. Additional information can be found in Section 5.2.

For all other projects, WPS obtains a general WDNR permit to cover pit/trench dewatering operations. Construction site performance standard for non-permitted sites (i.e., less than 1 acre of disturbance) can be found in NR 151.105. Note that the Pit/Trench Dewatering permit contains effluent limitations that are more restrictive than the performance standards in NR 151.11. Guidance on complying with the General WPDES permit for pit/trench dewatering can be found in Section 5.1.

The permit usage shall follow these guidelines and limitations:

1. Proper erosion and sediment control measures must be used.
2. Individual authorization must be given by WDNR for the discharge into a wetland prior to discharge.
3. A completed Pit/Trench Dewatering Form must be sent to WPS Lab, Green Bay, A1, every time a dewatering event occurs and the project is not covered under a site specific construction site stormwater permit. This form will be used regardless if a separate wetland permit has been issued for the project.
4. WPS must sample all discharges that flow directly into a lake, stream or wetland. This includes discharges to storm sewers that discharge to surface water.
5. Environmental Services must be contacted if dewatering is expected to last longer than two (2) days.

As used in this work practice, these words are defined as follows:[1]

1. Shall, will and must are used interchangeably and are used to express an action that is mandatory,
2. Should is used to express an action that is a preferred practice,
3. May and can are used to express an action that is optional.

3.0 GENERAL NOTES AND PRECAUTIONS

There are no general notes and precautions that apply to this work practice.

[1] Definitions are common to AGA and other similar sources

4.0 DEFINITIONS

1. WPDES: Wisconsin Pollution Discharge Elimination System
2. WPS Lab: WPS central environmental lab located in A-1, Green Bay

5.0 PROCEDURE

5.1 Guidance for Pit/Trench Dewatering Permit Compliance

This guidance is intended for controlling the discharge of contaminated water when necessary to pump from utility manholes or valves, regulating pits, bell holes and excavation sites *not* covered under a construction site storm water permit. It gives direction on use of available discharge controls and contracted services as needed to prevent discharge of oil or sediment to surface waters or storm drain systems during dewatering. For dewatering activities, the preferred option is to direct the discharge to an area where the water can infiltrate the ground.

1. Inspection and Assessment
    A. When necessary to remove accumulated water from utility manholes, etc., water must be observed for the presence of contamination prior to dewatering.
    B. Visually observe either in sufficient daylight, with aid of portable lighting, or by bringing a sample to the surface for presence of:
        i. Oil sheen (rainbow coloration)
        ii. Sediment/suspended solids contamination (cloudy appearance)
    C. If an oil sheen is present, determine whether source is mineral insulating transformer oil (MIO), or if other material, such as gasoline or diesel (note any diesel or gasoline odor). Collect a sample for lab analyses if not known.
    D. If MIO is the oil source, PCB concentrations must be determined either from definitive information available on the leaking equipment (year, mfr., etc.) or an oil sample taken.
    E. PCB Sampling for Lab Analyses – If possible, an oil sample should be delivered to WPS Lab for analysis. Oil samples for lab analysis can be collected from surface of water.
    F. PCB Field Screening – Field ChlorN Oil tests can be used to screen for PCB > 50 ppm to aid with initial response and handling determinations. They are not definitive results to determine for certain if no PCB present. In addition, the ChlorN Oil test requires essentially pure oil not mixed with water and should be collected directly from the equipment at the source.
2. Discharge
    A. Discharge to Upland Areas for Ground Infiltration:
        i. Sediment laden water (without oil) may be discharged direct to the ground without filtering if the total volume, in fact, soaks (infiltrates) into the ground without discharge to storm drain, wetland, or surface water.
            a. For this activity, you will need to verify compliance with the oil & grease limitation for discharges to groundwater. Observe and document whether there was an oil sheen/oil film present in the water to be discharged. If an oil sheen is present, the sheen will need to be removed using oil absorbent pads or similar material

before the water is pumped to an area where it can infiltrate. If the oil sheen cannot be removed, a contracted environmental service will need to remove and dispose of the water off-site. Document the discharge using a Pit/Trench Dewatering Form.

B. Discharge To Surface Water, Wetlands or Separate Storm Sewer Systems:
    i. All discharges to surface waters, wetlands, or storm sewer systems must be directed through a filtration device. Water visibly contaminated with suspended solids (cloudy) or any oil sheen may not be discharged directly to surface water, wetland, or storm sewer.
        a. Depending on the site and soil conditions, compliance with the total suspended solids effluent limitation may be attainable by the use of one sediment control, such as a straw bale barrier, sediment trap, or a filter sock/filter bag. However, a combination of sediment controls may be necessary (construct a dewatering structure, use silt fence, etc.).
            (a) Submersible pumps used for dewatering should be suspended off the bottom or positioned in a manner to minimize uptake of sediment from bottom of the area to be dewatered. This should be done to reduce load on filtering controls.
        b. If an oil sheen is present, attempt to remove the oil sheen with absorbent pads prior to pumping. If the sheen cannot be removed, a contracted environmental service will need to remove and dispose of the water off-site.
    ii. Water with no visible oil sheen or apparent sediment contamination may be discharged as long as water remains clear. If in the process of pumping out however, contamination becomes evident, discharge must be ceased and reassessed.
    iii. A sample of the discharge will need to be collected to demonstrate compliance with the discharge limitations for suspended solids. For oil and grease, if a sheen or film is not present on the water to be pumped, then document the absence of a sheen on the Pit/Trench Dewatering Form.

C. Sediment Control Devices
    i. Filtration - Visibly cloudy water may be filtered through a sediment filter device or other controls as necessary prior to discharging to surface or storm water drain. Filtration devices include (See 6.0 Associated Tools and Equipment):
        a. 16” x 8’ Dewatering sock (6 micron opening)
        b. 8” x 60”’ Dewatering sock (5 micron opening)
        c. Non-woven filter fabric for storm sewer inlet protection

D. Sample Collection
    i. A sample for total suspended solids must be collected in a 1-liter plastic bottle. All samples collected to demonstrate compliance with the permit

limitations must be collected by placing the bottle in the discharge stream after being treated (i.e., after passing through the filter bag, sock, etc.).

a. Contact the WPS Lab (433-1391 or 433-1833) to obtain sample bottles.
   NOTE: For contractors working on WPS projects, an outside lab should be contracted for the sampling materials and analysis.

ii. After sample collection, write the date and location the sample was collected on the sample bottle.

iii. Place the sample bottle in a cooler. Fill the cooler with a sufficient quantity of ice so that the sample will remain cold until received in the WPS Lab.

iv. Ship the cooler to the WPS Lab (GB – A1).

E. Sample Frequency

i. As a general guideline, when discharging to a surface water or storm sewer, a sample needs to be collected within the first 24 hours of discharge to verify compliance with the permit limitation.

ii. If multiple, continuous days of discharge are required for your project, sampling will need to be conducted weekly.

F. Recordkeeping

i. Regardless of where the discharge is directed, a condition of the Pit/Trench Dewatering permit is that WPS reports each instance of discharge to the Wisconsin Department of Natural Resources. As a result, the following information must be documented:

a. The date and location of the discharge,

b. Approximate the volume of water discharged (either measured or estimated based upon pump operating time and capacity),

c. Whether an oil sheen is present on the surface of the water discharged, and

d. The best management practices used to prevent the transport of suspended solids from the site to a surface water.

ii. Please refer to the Pit/Trench Dewatering Form to document the discharge activity. A copy of the dewatering log can be found in Appendix I and on the Powernet under WPS Forms, Pit/Trench Dewatering Form. Note that all dewatering logs must be forwarded to the WPS Lab so that the event can be reported to WDNR.

5.2 Guidance for WPDES Construction Site Storm Water Permit Compliance

This guidance is intended for controlling the discharge of contaminated water when necessary to pump from utility manholes or valves, regulating pits, bell holes and excavation sites covered under a construction site storm water permit. It gives direction on use of available discharge controls and contracted services as needed to prevent discharge of oil or sediment to surface waters or storm drain systems during dewatering. For dewatering activities, the preferred option is to direct the discharge to an area where the water can infiltrate the ground.

1. Inspection and Assessment

A. When necessary to remove accumulated water from utility manholes, etc., water must be observed for the presence of contamination prior to dewatering.
    i. Follow the procedure listed above in Section 5.1(1)(B) thru (F)

2. Discharge
    A. Discharge to Upland Areas for Ground Infiltration:
        i. Sediment laden water (without oil) may be discharged direct to the ground without filtering if the total volume, in fact, soaks (infiltrates) into the ground without discharge to storm drain or surface water.
            a. If an oil sheen is present, the sheen will need to be removed using oil absorbent pads or similar material before the water is pumped to an area where it can infiltrate. If the oil sheen cannot be removed, a contracted environmental service will need to remove and dispose of the water off-site.
    B. Discharge To Surface Water, Wetlands or Separate Storm Sewer Systems:
        i. All discharges to surface waters, wetlands, or storm sewer systems must be directed through a filtration device. Water visibly contaminated with suspended solids (cloudy) or any oil sheen may not be discharged directly to surface water or storm sewer.
            a. Depending on the site and soil conditions, compliance with the total suspended solids effluent limitation may be attainable by the use of one sediment control, such as a straw bale barrier, sediment trap, or a filter sock/filter bag. However, a combination of sediment controls may be necessary (construct a dewatering structure, use silt fence, etc.).
                (a) Submersible pumps used for dewatering should be suspended off the bottom or positioned in a manner to minimize uptake of sediment from bottom of the area to be dewatered. This should be done to reduce load on filtering controls.
            b. If an oil sheen is present, attempt to remove the oil sheen with absorbent pads prior to pumping. If the sheen cannot be removed, a contracted environmental service will need to remove and dispose of the water off-site.
    C. Sediment Control Devices
        i. Filtration - Visibly cloudy water may be filtered through a sediment filter device or other controls as necessary prior to discharging to surface or storm water drain. Filtration devices include (See 6.0 Associated Tools and Equipment):
            a. Silt Fence, 100’
            b. 6’ x 6’ geotextile dewatering bag
            c. 10’ x 15’ geotextile dewatering bag
            d. 60” dewatering sock (for excavation sites, 150 micron opening)
            e. Non-woven filter fabric for storm sewer inlet protection

6.0 ASSOCIATED TOOLS AND EQUIPMENT

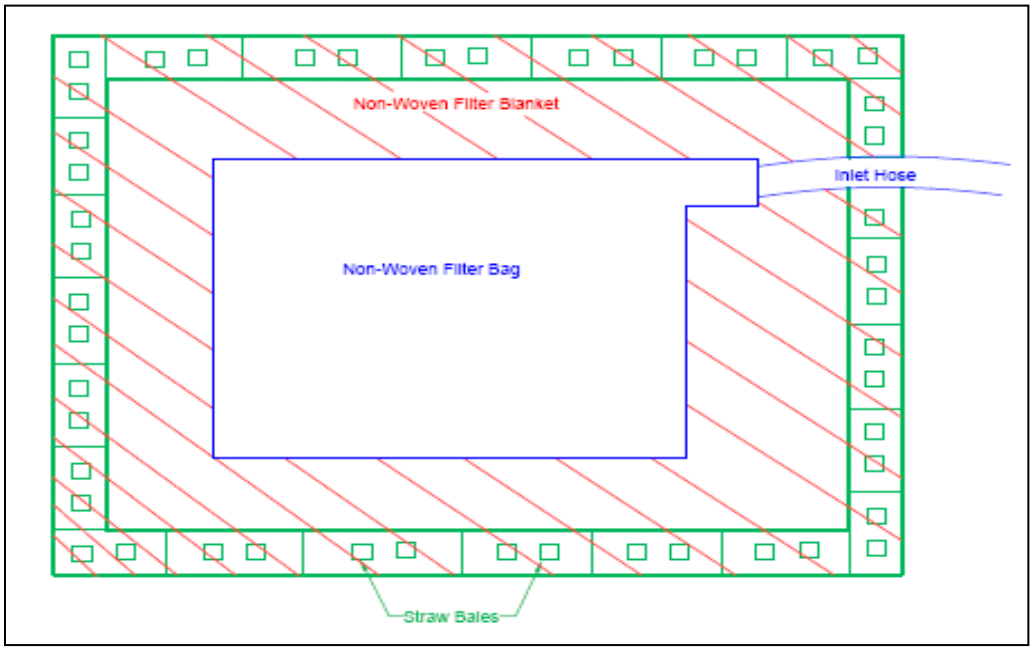
1. 16” x 8’ Dewatering sock (6 micron opening) – Pure Filter Solutions, Stock Code #1512204
2. 8” x 60”’ Dewatering sock (5 micron opening) – Pure Filter Solutions, Stock Code #1512203
3. Non-woven filter fabric for storm sewer inlet protection, Stock Code #1510239
4. Silt Fence, 100’, Stock Code #1512600
5. 6’ x 6’ geotextile dewatering bag, Stock Code #1512200
6. 10’ x 15’ geotextile dewatering bag, Stock Code #1512201
7. 60” dewatering sock (for excavation sites, 150 micron opening), Stock Code #1512202

The following are examples of best management practices that can be used to remove sediment from a pit or trench that needs to be dewatered:

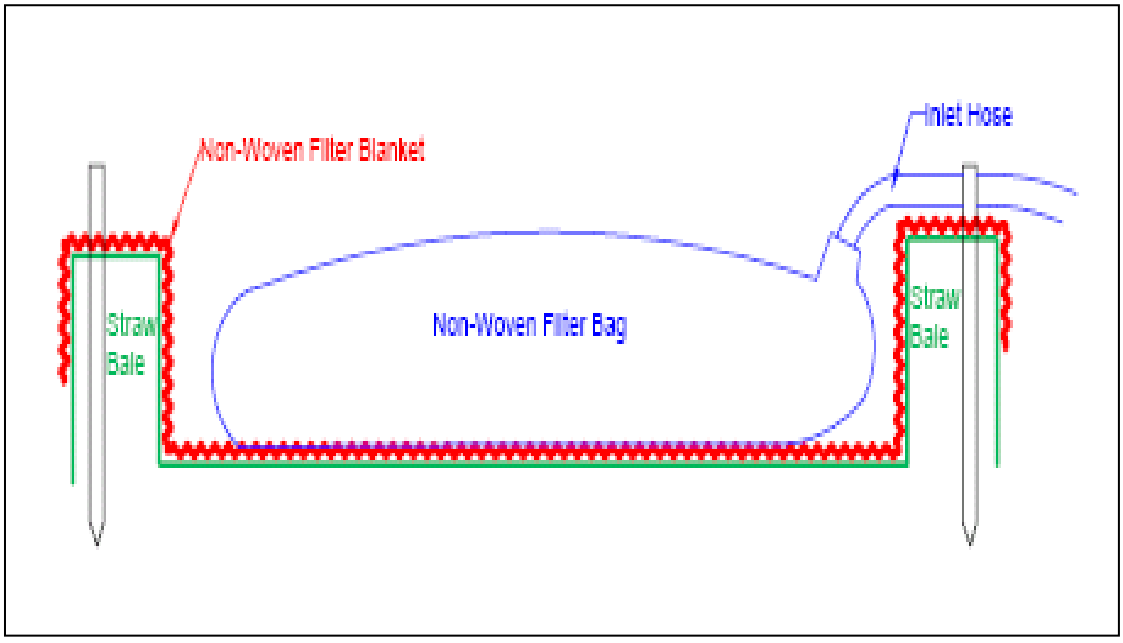
1. Filter Bag

2. Filter Sock

3. Dewatering Structure – Top view



4. Dewatering Structure - Side view



5. Sediment Trap

Appendix 1 Pit Trench Dewatering Form

Return to Environmental Services – Central Lab (GB – A1) within 5 days of the end of the month after the dewatering event occurred.

Wisconsin Public Service

Pit/Trench Dewatering Log

Name:_____

Date: _____ **District Name or No.:**_____

Location:_____

Amount of Discharge (select one): Volume: _____ gallons

OR Pump time: _____ Hours _____ Minutes @ _____ Rate (gpm / gph)

Where was the water discharged? □ Ground/Infiltration □ Storm Sewer □ Surface Water

Best Management Practice Used: □ Ponding □ Grassy Area □ Gravel □ Filter Fabric (filter bag/sock) □ Absorbent Pad □ Straw Bale □ Other

Oil Sheen Present? □ Yes □ No

Note: All discharges to a storm sewer or surface water require sampling and analysis of the discharge to verify permit compliance.

Return to Environmental Services – Central Lab (GB – A1) within 5 days of the end of the month after the dewatering event occurred.

Wisconsin Public Service

Pit/Trench Dewatering Log

Name:_____

Date: _____ **District Name or No.:**_____

Location:_____

Amount of Discharge (select one): Volume: _____ gallons

OR Pump time: _____ Hours _____ Minutes @ _____ Rate (gpm / gph)

Where was the water discharged? □ Ground/Infiltration □ Storm Sewer □ Surface Water

Best Management Practice Used: □ Ponding □ Grassy Area □ Gravel □ Filter Fabric (filter bag/sock) □ Absorbent Pad □ Straw Bale □ Other

Oil Sheen Present? □ Yes □ No

Note: All discharges to a storm sewer or surface water require sampling and analysis of the discharge to verify permit compliance.

Appendix G-2

Example

Erosion Mats

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Gas Work Practice

WP 1371-WPS: Erosion Mats

Revision 1.0
4/29/2016

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1.0 PURPOSE

The purpose of this practice is to protect the soil surface from the erosive effect of rainfall and prevent sheet erosion during the establishment of grass or other vegetation, to reduce soil moisture loss due to evaporation, and to protect the channel from erosion or act as turf reinforcement during and after the establishment of grass or other vegetation in a channel.

This practice applies to both Erosion Control Revegative Mats (ECRM) and Turf-Reinforcement Mats (TRM).

2.0 SCOPE AND APPLICABILITY

This work practice establishes the minimum standards for design, installation, and performance requirements. Only those mats listed in this work practice shall be used. Additional mats listed on the Wisconsin Department of Transportation (WisDOT) Erosion Control Product Acceptability List (PAL) may be considered for use upon approval by the Environmental Department.

This work practice applies to erosion mat selection for use on erodible slopes.

For channels, this work practice applies where runoff channelizes in intermittent flow and vegetation is to be established. Some products may have limited applicability in projects adjacent to navigable waters.

As used in this work practice, these words are defined as follows:[1]

1. Shall, will and must are used interchangeably and are used to express an action that is mandatory,
2. Should is used to express an action that is a preferred practice,
3. May and can are used to express an action that is optional.

3.0 GENERAL NOTES AND PRECAUTIONS

There are no general notes and precautions that apply to this work practice.

4.0 DEFINITIONS

1. Erosion Mat: A protective soil cover of straw, wood, coconut fiber or other suitable plant residue, or plastic fibers formed into a mat, usually with a plastic or biodegradable mesh on one or both sides. Erosion mats are rolled products available in many varieties and combination of materials and with varying life spans.

5.0 PROCEDURE

5.1 Non-Channel Erosion Mats

1. Criteria
    A. Design
        i. Non-Channel Erosion Mat is a weather independent practice and may be specified during growing or non-growing seasons.

[1] Definitions are common to AGA and other similar sources

ii. Slope and slope length shall be taken into consideration. This information can be found in the Slope Erosion Control Matrix located in the PAL.
iii. To differentiate applications, Erosion mats are organized into three Classes of mats, which are further broken down into various Types:
    a. Class I: A short-term duration (minimum of 6 months), light duty, organic mat with photodegradable plastic or biodegradable netting.
        (a) Type A – Use on erodible slopes 2.5:1 or flatter.
        (b) Type B – Double netted product for use on erodible slopes 2:1 or flatter. Double netted product is not mower friendly.
    b. Class I, Urban: A short-term duration (minimum of 6 months), light duty, organic erosion control mat which can be placed in environmentally sensitive areas or areas where foot traffic is anticipated and mowing may be accomplished within two weeks after installation.
        (a) Urban, Type A – Use on erodible soils with slopes 4:1 or flatter.
        (b) Urban, Type B – A double netted product for use on slopes 2.5:1 or flatter. **Recommended for use in environmentally sensitive areas that have a high probability of entrapping animals in plastic netting.**
    c. Class II: A long-term duration (three years or greater), organic erosion control revegetative mat.
        (a) Type A – Jute fiber only for use on slopes 2:1 or flatter for sod reinforcement.
        (b) Type B – For use on slopes 2:1 or greater made with plastic or biodegradable net.
        (c) Type C – A woven mat of 100% organic fibers for use on slopes 2:1 or flatter and in environmentally and biologically sensitive areas where plastic netting is inappropriate. **Recommended for use in environmentally sensitive areas that have a high probability of entrapping animals in plastic netting.**
    d. Class III: A permanent 100% synthetic ECRM or TRM. Either a soild stabilizer Type A or Class I, Type A or B erosion mat must be placed over the soil filled TRM.
        (a) Type A – An ECRM for use on slopes 2:1 or flatter.
        (b) Type B or C – A TRM for use on slopes 2:1 or flatter.
        (c) Type D – A TRM for use on slopes 1:1 or flatter.

B. Inspection/Installation
    i. Install Non-Channel Erosion Mat per manufacturer specifications at locations shown on plans and as the engineer/inspector directs.
    ii. For mats that utilize netting, the netting shall be bonded to the parent material to prevent separation of the net for the life of the product.

iii. For urban class mats the following material requirements shall be adhered to:
   a. Only 100% organic biodegradable netted products are allowed, including parent material, stitching, and netting.
   b. The netting shall be stitched with biodegradable thread/yarn to prevent separation of the net from parent material.
   c. All materials and additive components used to manufacture the anchoring devices shall be completely biodegradable as determined by ASTM D 5338.
   d. Mats with photodegradable netting shall not be installed after September 1st.

iv. ECRMs shall be installed after all topsoiling, fertilizing, liming and seeding are complete.

v. The mat shall be in firm and intimate contact with the soil. It shall be installed and anchored per the manufacturer's recommendation.

vi. TRM shall be installed in conjunction with the topsoiling operation and shall be followed by ECRM installation.

vii. At time of installation, document the manufacturer and mat type by retention of material labels and manufacturer's installation instructions. Retain this documentation until the site has been stabilized.

2. Considerations
   A. Consider using Class 2, Type C mats adjacent to waterways where trapping small animals is to be avoided – Urban mats can also be used in these areas and are more economical.
   B. Urban mats may be used in lieu of sod in mowable areas. Urban mat is not required in mowed areas, but is available for use if owner requests a 'mower friendly' mat.
   C. Documentation of materials used, monitoring logs, project diary and weekly inspection forms, including erosion and storm water management plans, should be turned over to the authority charged with long term maintenance of the site.
3. Operation and Maintenance
   A. Erosion mats shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period until disturbed area is stabilized and permit terminated (if applicable).
   B. If there are signs of rilling under the mat, install more staples or more frequent anchoring trenches. If rilling becomes severe enough to prevent establishment of vegetation, remove the section of mat where the damage has occurred. Fill the eroded area with topsoil, compact, reseed and replace the section of mat, trenching and overlapping ends per manufacturer's recommendations. Additional staking is recommended near where rilling was filled.
   C. If the reinforcing plastic netting has separated from the mat, remove the plastic and if necessary replace the mat.
   D. Maintenance shall be completed as soon as possible with consideration to site conditions.

5.2 Channel Erosion Mats

1. Criteria
    A. Design
        i. Channel Erosion Mat is a weather independent practice and may be specified during growing or non-growing seasons.
        ii. Channel Erosion Mat shall be specified when the disturbed area contains a channel or portion thereof.
        iii. To differentiate applications, erosion mats are broken into three classes of mats, which are further broken down into various Types.
            a. Class I: A short-term duration (minimum of 6 months), light duty, organic ECRM with plastic or biodegradable netting.
                (a) Type A – NOT allowed to be used for channel protection.
                (b) Type B – Double netted product for use in channels where the calculated (design) shear stress is 1.5 lbs/ft² or less.
            b. Class II: A long-term duration (three years or greater), organic ECRM.
                (a) Type A – Jute fiber only for use in channels to reinforce sod.
                (b) Type B – For use in channels where the calculated (design) shear stress is 2.0 lbs/ft² or less. Made with plastic or biodegradable mat.
                (c) Type C – A woven mat of 100% organic material for use in channels where the calculated (design) shear stress is 2.0 lbs/ft² or less. Applicable for use in environmentally sensitive areas where plastic netting is inappropriate.
            c. Class III: A permanent 100% synthetic ECRM or TRM. Class I, Type B erosion mat or Class II, Type B or C erosion mat must be placed over a soil filled TRM.
                (a) Type A – An ECRM for use in channels where the calculated (design) shear stress of 2.0 lbs/ft² or less.
                (b) Type B – A TRM for use in channels where the calculated (design) shear stress of 2.0 lbs/ft² or less.
                (c) Type C – A TRM for use in channels where the calculated (design) shear stress of 3.5 lbs./ft² or less.
                (d) Type D – A TRM for use in channels where the calculated (design) shear stress of 5.0 lbs/ft² or less
    B. Inspection/Installation
        i. Install Channel Erosion Mat as the plans show and as the engineer/inspector directs.
        ii. ECRM shall be installed after all topsoiling, fertilizing, and seeding is complete.
        iii. Erosion mats shall extend for whichever is greater: upslope one-foot minimum vertically from the ditch bottom or 6 inches higher than the Design Channel Flow Depth.

iv. The mat shall be in firm and continuous contact with the soil. It shall be anchored, overlapped, staked and entrenched per the manufacturer's recommendations.
v. TRM shall be installed in conjunction with the topsoiling operation and shall be followed by ECRM installation.
vi. At time of installation, document the manufacturer and mat type by saving material labels and manufacturer's installation instructions. Retain this documentation until the site is stabilized.

2. Considerations
   A. Consider using Class 2, Type C mats adjacent to waterways where trapping small animals is to be avoided – Urban matting is not allowable in channels.
   B. Class 3 TRM may be appropriate as a replacement for riprap as a channel liner. Check the shear stress criteria for the channel to determine mat applicability.
   C. Once a gully has formed in a channel, it is difficult to stabilize due to loss of soil structure. Even when the gully is filled with topsoil and reseeded, the soil has a tendency to dislodge in the same pattern. If gully formation continues to be a problem the design should be reevaluated, including other mat classes, ditch checks or riprap.
   D. It may be difficult to establish permanent vegetation and adequate erosion protection in a channel with continuous flow. Consider riprap or planting wetland species with an ECRM.
   E. Documentation of materials used, monitoring logs, project diary, and weekly inspection forms including erosion and storm water management plans, should be provided to the authority charged with long term maintenance of the site.
   F. Channel cross sections may be parabolic, v-shaped or trapezoidal. The use of "V" channels is generally discouraged due to erosion problems experienced.
3. Operation and Maintenance
   A. Erosion mats shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period until disturbed area is stabilized and permit terminated (if applicable).
   B. If there are signs of rilling under the mat, install more staples or more frequent anchoring trenches. If rilling becomes severe enough to prevent establishment of vegetation, remove the section of mat where the damage has occurred. Fill the eroded area with topsoil, compact, reseed and replace the section of mat, trenching and overlapping ends per manufacturer's recommendations. Additional staking is recommended near where rilling was filled.
   C. If the reinforcing plastic netting has separated from the mat, remove the plastic and if necessary replace the mat.
   D. Maintenance shall be completed as soon as possible with consideration to site conditions.

6.0 ASSOCIATED TOOLS AND EQUIPMENT

1. Erosion mat (Blanket ,Grass, Erosion Control, 4' X 180', Curlex 1), Stock Code #1519309

Appendix G-3

Example

Sediment Control

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Gas Work Practice

WP 1372-WPS: Sediment Control

Storm Drain Inlet, Silt Fence, Bale Barrier, Wattles, Sand Bags and Ditch Check

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4/29/2016

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1.0 PURPOSE

The purpose of this work practice is to keep eroded soil on a construction site, so that it does not wash off and cause water pollution to a nearby stream, river, lake, or wetland. Sediment controls are generally designed to be temporary measures installed during construction until the site has been stabilized.

2.0 SCOPE AND APPLICABILITY

This work practice applies to all WPS construction sites. Construction sites that impact over one (1) acre and are covered under a Wisconsin Pollution Discharge Elimination System (WPDES) storm water construction permit shall follow the project specific erosion and sediment control plan. All other projects regardless of size shall install and maintain the appropriate erosion and sediment control Best Management Practices (BMPs) needed to prevent erosion and sedimentation into nearby waterways, wetlands, or storm sewer inlets.

As used in this work practice, these words are defined as follows:[1]

1. Shall, will and must are used interchangeably and are used to express an action that is mandatory,
2. Should is used to express an action that is a preferred practice,
3. May and can are used to express an action that is optional.

3.0 GENERAL NOTES AND PRECAUTIONS

Sediment controls are usually employed together with erosion controls, which are designed to prevent or minimize erosion and thus reduce the need for sediment controls.

4.0 DEFINITIONS

1. BMP: Best Management Practice
2. Log-Type Products: Sediment control products constructed of an outer sock of geotextile or other type of netting or permeable containment media surrounding an inner filtering media.
3. Silt Fence: Temporary sediment barrier of entrenched permeable geotextile fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff from small areas of disturbed soil.
4. Manufactured perimeter control and slope interruption products: Variety of products designed to detain the flow of sediment-laden sheet flow runoff from small areas of disturbed soil.
5. Sediment Bale Barrier: Temporary sediment barrier consisting of a row of entrenched and anchored straw bales, hay bales, or equivalent material used to intercept sediment-laden sheet flow from small drainage areas of disturbed soil.
6. Storm Drain Inlet Protection: Temporary barrier installed in or around a storm drain inlet, drop inlet, or curb inlet.
7. WPDES: Wisconsin Pollution Discharge Elimination System

[1] Definitions are common to AGA and other similar sources

5.0 PROCEDURE

5.1 Storm Drain Inlet Protection

1. Applies where runoff from construction sites enters conveyance system structures such as drain inlets, drop inlets, and curb inlets.
    A. Inlet protection devices are for drainage areas of one acre or less.
    B. Runoff from areas larger than one acre shall be routed through a properly designed sediment trapping or settling practice upstream of the inlet.
2. The appropriate type of inlet protection barrier shall be installed once the drain, drop, or curb inlet can receive runoff. The device shall remain in place and be maintained until the disturbed area is stabilized.
3. Design Requirements:
    A. Specify installation of Storm Drain Inlet Protection at any existing or proposed inlet within the disturbed area or where the potential exists for disturbed area to flow to an inlet. This includes inlets not immediately adjacent to the construction site. Down gradient inlets outside of the project area shall be evaluated if inlet protection is required.
    B. Must be designed to Section 5.1. 1.(A) and (B).
    C. All fabrics used for inlet protection devices must be approved fabrics for inlet protection as specified WDNR Technicial Standard - Storm Drain Inlet Protection for Construction Sites (1060), or in the current addition of the WisDOT Product Acceptability List (PAL).
2. Inspection and Installation Requirements:
    A. Ponding water to settle sediment is encouraged; however ponding shall not interfere with the flow of traffic, create a safety hazard, or cause property damage. All devices shall have provisions such as weep holes or “emergency spillways” to safely pass water if the device becomes clogged.
    B. Other than Type D inlet protection devices, no gaps shall be left in the material used that would allow the flow of water to bypass the inlet protection device.
    C. Criteria Applicable to Unpaved areas or the Pre-Paving Phase of Construction
        i. Inlet Protection Barriers include, but are not limited to, straw bales, sandbags, other material filled bags and socks, and stone weepers. These devices can be used to either settle sediments or divert flows.
            a. Manufactured bags, when used, shall conform to the standards in Table 5.1.1.

Table 5.1.1.	
Minimum Size	14 x 26 inches
Grab Tensile strength of fabric, ASTM D-4632	95 lb. min.
UV stability, ASTM D-4355	70% min.
Note: To provide sufficient strength, fabric shall be sewn together with double stitching.	

            b. Straw Bale installation shall conform to the criteria outlined in the section 5.6 Ditch Check.

c. Stone weeper installation shall conform to the criteria in WDNR Technical Standard (1063) Sediment Trap.

ii. Filter Fabric Barrier Criteria – Catch Basin Inlet Protection (Appendix 1)

a. Type A devices shall be utilized around inlets and unpaved areas until permanent stabilization methods have been established. Type A devices shall be utilized on inlets prior to installation of curb and gutter or pavement, and where safety considerations are not compromised on the site.

b. Types B &C shall be utilized after the casting and grate are in place.

c. Type D shall be utilized in areas where other types of inlet protection are identified as incompatible with roadway and traffic conditions, causing possible safety hazards when ponding occurs at the inlet. Type D shall only be used after castings are in place on top of the inlet boxes. Type D inlet protection shall conform to the standard drawing as shown in the plans. There shall be a three-inch space between the bag and the sides of the inlet to prevent the inlet sides from blocking the overflow; and shall only be used in inlets deeper than 30 inches from the top of grate to bottom of the inlet. If such clearance is not available, cinch or tie the sides of the bag (with rope or ties) to provide clearance.

D. Criteria Applicable to the Post-Paving / Curbing Phase of Construction

i. Inlet protection Types B, C, and D are applicable to post paving construction. (See Appendix 1 Catch Basin Inlet Protection.)

ii. Type B shall be utilized on inlets without curb box.

iii. Type C shall be utilized on street inlets with curb heads. A 2-inch by 4-inch (nominal) piece of wood shall be wrapped and secured in the fabric and placed in front of the curb head as shown in the figures. The wood shall not block the entire opening of the curb box and be secured to the grate with wire or plastic ties.

iv. Type D shall be utilized in areas where other types of inlet protection are identified as incompatible with roadway and traffic conditions causing possible safety hazards when ponding occurs at the inlet. The inlet protection shall conform to the standard detail drawing as shown in the plans.

3. Considerations

A. When site conditions allow, inlets should be temporarily closed or sealed to prevent entrance of runoff and sediment.

B. The best way to prevent sediment from entering the storm sewer system is to stabilize the disturbed area of the site as quickly as possible, preventing erosion and stopping sediment transport at its source.

C. Storm drain inlet protection consists of several types of inlet filters and traps and should be considered as only one element in an overall erosion control plan. Each type differs in application with selection dependent upon site conditions and inlet

type. Not all designs are appropriate in all cases. The user must carefully select a design suitable for the needs and site conditions.

D. Inlet protection is only as effective as the filter or barrier used around the inlet. Effectiveness decreases rapidly if the inlet protection is not properly maintained. In general, inlet protection provides relatively good removal of coarse and medium-sized soil particles from runoff however, most fine silt and clay particles will pass through the filtering mechanisms.

E. Properly maintaining inlet protection can be difficult and often inlets can become clogged. Field experience has shown that inlet protection that causes excessive ponding in an area of high construction activity may become so inconvenient that it is simply removed or bypassed, thus transmitting sediment-laden flows unchecked. In such situations, a structure with an adequate overflow mechanism should be utilized instead of simply removing the inlet protection device.

F. Inlet protection devices can be enhanced by additional excavation to increase the storage capacity around the inlet.

G. Good construction site housekeeping measures, such as keeping the gutters clean, and street sweeping are important.

4. Operation and Maintenance

A. Remove inlet protection devices once the contributing drainage area is stabilized with appropriate vegetation or impervious area.

B. Inlet protection shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period until disturbed area is stabilized and permit terminated (if applicable).

C. Sediment deposits shall be removed and the inlet protection device restored to its original dimensions when the sediment has accumulated between 1/3 to 1/2 the design depth of the device, or when the device is no longer functioning as designed. Removed sediment shall be deposited in a suitable area and stabilized.

D. Due care shall be taken to ensure sediment does not fall into the inlet and impede the intended function of the device. Any material falling into the inlet shall be removed.

5.2 Silt Fence

1. Conditions Where This Practice Applies

A. This practice applies to the following applications:

i. Erosion occurs in the form of sheet and rill erosion. There is no concentration of water flowing to the barrier (channel erosion).

ii. Where adjacent areas need protection from sediment-laden runoff.

iii. Where effectiveness is required for one year or less.

iv. Where conditions allow products to be properly installed as outlined in the Section 5.2(2).

B. Under no circumstance shall silt fence be used in the following applications:

i. Below the ordinary high watermark or placed perpendicular to flow in streams, swales, ditches, or any place where flow is concentrated.

ii. Where the maximum gradient upslope of the product is greater than 50% (2:1).

2. Installation Requirements (See Appendix 2 Silt Fence):
   A. Placement
      i. When installed as a stand-alone practice on a slope, silt fence shall be placed on the contour. The parallel spacing shall not exceed the maximum slope lengths for the appropriate slope as specified in Table 5.2.1.

Table 5.2.1.	
Slope	**Fence Spacing**
< 2%	100 feet
2 to 5%	75 feet
5 to 10%	50 feet
10 to 33%	25 feet
> 33%	20 feet

      ii. Silt fences shall not be placed perpendicular to the contour.
      iii. The ends of the fence shall be extended upslope to prevent water from flowing around the ends of the fence.
   B. Height
      i. Installed silt fences shall be a minimum 14 inches high and shall not exceed 28 inches in height measured from the installed ground elevation.
   C. Support
      i. Silt fences shall be supported by either steel or wood supports as specified below:
         a. Wood Supports
            (a) The full height of the silt fence shall be supported by 1 1/8 inches by 1 1/8 inches air or kiln dried posts of hickory or oak.
            (b) The silt fence fabric shall be stapled, using at least 0.5-inch staples, to the upslope side of the posts in at least 3 places.
            (c) The posts shall be a minimum of 3 feet long for 24-inch silt fence and a minimum of 4 feet for 36-inch silt fence fabric.
         b. Steel Supports
            (a) The full height of the silt fence shall be supported by steel posts at least 5 feet long with a strength of 1.33 pounds per foot and have projections for the attachment of fasteners.
            (b) The silt fence fabric shall be attached in at least three places on the upslope side with 50 pound plastic tie straps or wire fasteners. To prevent damage to the fabric from fastener, the protruding ends shall be pointed away from the fabric.
      ii. Maximum spacing between posts
         a. 3 feet for nonwoven silt fence
         b. 8 feet for woven fabric

iii. Silt fence shall have a support cord.
iv. Where joints are necessary, each end of the fabric shall be securely fastened to a post. The posts shall then be wrapped around each other to produce a stable, secure joint or shall be overlapped the distance between two posts. (See Appendix 3 Silt Fence Tie Back and Joining Methods)
v. A minimum of 20 inches of the post shall extend into the ground after installation.

D. Anchoring
i. Silt fence shall be anchored by spreading at least 8 inches of the fabric in a 4 inch wide by 6 inch deep trench, or 6 inch deep V-trench on the upslope side of the fence. The trench shall be backfilled and compacted. Trenches shall not be excavated wider and deeper than necessary for proper installation.
ii. On the terminal ends of silt fence, the fabric shall be wrapped around the post such that the staples are not visible.

E. Geotextile Fabric Specifications
i. The geotextile fabric consists of either woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride. Non-woven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof. All fabric shall meet the following requirements as specified in Table 5.2.2.

Table 5.2.2.

Test Requirement	Method	Value[1]
Minimum grab tensile strength in the machine direction	ASTM D 4632	120 lbs. (550 N)
Minimum grab tensile strength in the cross machine direction	ASTM D 4632	100 lbs. (450 N)
Maximum apparent opening size equivalent standard sieve	ASTM D 4751	No. 30 (600 µm)
Minimum permittivity	ASTM D 4491	0.05 scc^{-1}
Minimum ultraviolet stability percent of strength retained after 500 hours of exposure	ASTM D 4355	70%

(WisDOT Standard Specifications for Road and Bridge Construction, 2001)

[1] All numerical values represent minimum / maximum average roll values. (For example, the average minimum test results on any roll in a lot should meet or exceed the minimum specified values.)

ii. Silt fence shall have a maximum flow rate of 10-gallons/minute/square foot at 50mm constant head as determined by multiplying permittivity in 1/second as determined by ASTM D-4491 by a conversion factor of 74.

F. Removal
   i. Silt fences shall be removed once the disturbed area is permanently stabilized and no longer susceptible to erosion.

3. Considerations
   A. Improper placement as well as improper installation and maintenance of silt fences will significantly decrease the effectiveness of this practice.
   B. Silt fences should be considered for trapping sediment where sheet and rill erosion may be expected to occur in small drainage areas.
   C. Silt fences should not be placed in areas of concentrated flow.
   D. Silt fences should be installed prior to disturbing the upslope area.
   E. Silt fences should not be used to define the boundaries of the entire project. Silt fence should be placed only in areas where it is applicable due to its cost and the fact that it is not biodegradable. For example, silt fence should not be placed in locations where the natural overland flow is from an undisturbed area into disturbed areas of the project. It should also not be used as a diversion.
   F. Silt fence should not be used in areas where the silt fence is at a higher elevation than the disturbed area.
   G. When placing silt fence near trees, care should be taken to minimize damage to the root system. Avoid compaction and root cutting within 1.5 feet multiplied by the inch diameter of the tree (example: for 10 inch trees, keep out a 15-foot radius from the trunk). Refer to UWEX publication Preserving Trees During Construction for more information.
   H. To protect silt fence from damage in areas of active construction or heavy traffic, silt fence should be flagged, marked, or highlighted to improve visibility.
   I. Silt fence effectiveness is generally increased when used in conjunction with other upslope erosion control practices. To further strengthen the silt fence, straw/hay bales can be placed on the down slope side.
   J. To help ensure effectiveness, silt fence should be inspected and repaired as necessary prior to forecasted rain events.
   K. Where installation with wood posts is difficult, such as when hard or frozen ground is encountered, the use of steel posts is recommended.
   L. Silt fence can be mechanically installed with a plow-type device, provided the silt fence is trenched in a manner such that appropriate anchoring is achieved as stated within this practice.

4. Operation and Maintenance
   A. Silt fences shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.
   B. Damaged or decomposed fences, undercutting, or flow channels around the end of barriers shall be repaired or corrected.

C. Sediment shall be properly disposed of once the deposits reach ½ the height of the fence.

5.3 Bale Barrier (Non-channel) – WDNR Conservation Practice Standard 1055

1. Conditions Where This Practice Applies
   A. This practice applies to the following applications where:
      i. Erosion occurs in the form of sheet and rill erosion. There is no concentration of water flowing to the barrier (channel erosion).
      ii. Where adjacent areas need protection from sediment-laden runoff.
      iii. Effectiveness is required for less than 3 months.
      iv. Conditions allow for the bales to be properly entrenched and staked as outlined in the Section 5.3(2)(A).
   B. Under no circumstance shall sediment bale barriers be used in the following applications:
      i. Below the ordinary high watermark or placed perpendicular to flow in streams, swales, ditches or any place where flow is concentrated.
      ii. Where the maximum gradient upslope of the sediment bale barriers is greater than 50% (2:1).
2. Criteria
   A. This section establishes the minimum standards for design, installation, and performance requirements.
      i. Placement
         a. At a minimum, sediment bale barriers shall be placed in a single row, lengthwise on the contour, with the ends of adjacent sediment bale barriers tightly abutting one another. The holes between bales shall be chinked (filled by wedging) with straw, hay, or equivalent material to prevent water from escaping between the bales.
         b. The maximum allowable slope lengths contributing runoff to a sediment bale barrier are specified in Table 5.3.1.

Table 5.3.1.	
Slope	**Barrier Row Spacing**
< 2%	100 feet
2 to 5%	75 feet
5 to 10%	50 feet
10 to 33%	25 feet
33 to 50%	20 feet
> 50%	Not Permitted

         c. Sediment bale barriers shall not be placed perpendicular to the contour.
         d. The end of the sediment bale barrier shall be extended upslope to prevent water from flowing around the barrier ends.
      ii. Height

a. Installed sediment bale barrier shall be a minimum of 10 inches high and shall not exceed a maximum height of 20 inches from ground level.

iii. Anchoring and Support

a. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a sediment bale barrier and the length of the proposed barrier to a minimum depth of 4 inches. After bales are staked and chinked, the excavated soil shall be backfilled and compacted against the barrier. Backfill to ground level on the down slope side. On the upslope side of the sediment bale barrier backfill to 4 inches above ground level.

b. At least two wood stakes, "T" or "U" steel posts, or ½ inch rebar driven through at equidistance along the centerline of the barrier shall securely anchor each bale. The minimum cross sectional area for wood stakes shall be 2.0 by 2.0 inches nominal. The first stake in each bale shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven a minimum 12 inches into the ground to securely anchor the sediment bale barriers.

c. Bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings

3. Considerations

A. Improper placement as well as improper installation and maintenance of sediment bale barriers will significantly decrease the effectiveness of this practice.

B. Sediment bale barriers should not be used upslope of the disturbed area.

C. A double row of sediment bale barriers may be installed in areas where additional protection is needed.

D. For safety, place all anchoring flush with the sediment bale barrier or cap any exposed anchoring device.

4. Operation and Maintenance

A. Sediment bale barriers shall, at a minimum, be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

B. Damaged or decomposed sediment bale barriers, any undercutting, or flow channels around the end of the sediment bale barriers, shall be repaired.

C. Sediment shall be properly disposed of once the deposits reach 1/2 the height of the sediment bale barrier.

D. Sediment bale barriers and anchoring devices shall be removed and properly disposed of when they have served their usefulness, but not before the upslope areas have been permanently stabilized.

E. Any sediment deposits remaining in place after the sediment bale barrier is no longer required shall be dressed to conform to the existing grade, prepared and seeded.

5.4 Wattle

1. The purpose of the installation of these products is to reduce uninterrupted slope length to slow the velocity of runoff so as to retain transported sediment from disturbed areas.
2. Conditions Where This Practice Applies
    A. This practice applies to the following conditions:
        i. Where only sheet and rill erosion occurs unless the product is listed as approved for use in concentrated flow areas (channel erosion) as a ditch check on the Wisconsin Department of Transportation (WisDOT) Erosion Control Product Acceptability List (PAL) and is designed and installed in accordance with Section 5.6 of this work practice. All products that are not approved for use in concentrated flow areas and are to be installed on a slope that terminates in a channel shall be installed at an elevation no lower than 6 inches above the design flow depth of the channel.
        ii. Where usage is limited to 12 consecutive months.
        iii. Where conditions allow for proper installation as outlined in the Criteria Section 5.4(3).
    B. Under no circumstance should products be used in the following applications:
        i. Below the ordinary high watermark or placed perpendicular to flow in streams.
        ii. Where the maximum gradient upslope of the product is steeper than 50% (2:1).
3. Criteria
    A. Product Classes
        i. Product classes are based on the installed product height as illustrated in Appendix 4 Straw Wattle Product classes are specified in Table 5.4.1.

Table 5.4.1

Product Height Class	Installed Height Above Grade (inches)
Class I	Mat Products
Class II	6-9
Class III	10-15
Class IV	16-20
Class V	>20

    B. Placement
        i. Products should be placed on the contour whenever possible. See Appendix 4 (Straw Wattle) for installation illustrations for log-type products.
        ii. Products should not be placed perpendicular to the contour.
        iii. The ends of product installations should be extended upslope to prevent water from flowing around the ends of the product.
        iv. Products that are placed on a curved alignment shall be installed at a large enough radius of curvature to prevent kinking.
    C. Entrenchment

i. Disturbed Ground
   a. Log-type products installed on disturbed ground shall be entrenched a minimum of 2 inches to ensure continuous ground contact.

ii. Vegetated Ground
   a. Log-type products installed on vegetated ground may be installed without entrenchment. All gaps and ruts creating an undercutting situation shall be filled with soil or log-type product filter media.

iii. Frozen Ground
   a. No entrenchment required.
   b. Only products approved for installation on frozen ground under the Commerce product approval process or listed in the WisDOT PAL for installation on frozen ground may be installed on frozen ground.
   c. Products installed on frozen ground shall be assessed for effectiveness upon ground thaw and staked or replaced as needed.

D. Overlap
   i. Minimum 24 inches or as required by the manufacturer if more restrictive. Overlap should be shingled in the direction of flow.

E. Support
   i. Stake or anchor as needed to maintain constant ground contact along the entire length of product at all times and to prevent lateral movement and/or floatation. Staking or anchoring shall be performed per manufacturer's recommendations or as specified under Commerce or WisDOT product approval stipulations.

F. Product Stacking
   i. Product Stacking – Products shall not be stacked individually on top of one another. Products may be stacked in a "pyramid" manner (i.e., one on top of two) or for operation and maintenance purposes as stipulated in Section 5.4(3)(1.)(iii).

G. Maximum Spacing
   i. The spacing in direction of slope shall not exceed the maximum slope lengths for the appropriate slope as specified in Table 5.4.2.

Table 5.4.2

	Max. Spacing (ft) per Product Class				
Slope	**I**	**II**	**III**	**IV**	**V**
0-2%	30	30	55	75	100
2.1-5%	25	25	40	55	75
5.1-10%	15	15	30	40	50

Notes:
1. NA = Not Allowed
2. Products from a higher class are suitable for applications in a lower class.
3. Manufacturer's recommendations for maximum slope and maximum spacing should be used if more restrictive than the guidelines established above.

ii. Products should be installed prior to disturbing the upslope area and/or when changes in disturbed slope or slope length require the installation of additional products.
iii. The width of mat type products used for perimeter control/slope interruption shall be as specified in the product approval from Commerce or as specified in the WisDOT PAL.

H. Considerations
i. To help ensure effectiveness, products should be inspected and repaired as necessary prior to forecasted rain events.
ii. Vehicular traffic should be diverted around the product unless allowed under the manufacturer's specifications.
iii. When products are used to divert runoff, discharge should be made to a stabilized area or sediment control practice.
iv. Products may be used in conjunction with other practices such as WP 1375-WPS Restoration and WP 1371-WPS Erosion Mats to enhance performance.

I. Operation and Maintenance
i. Products shall be inspected at least weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.
ii. If the product becomes undermined, the voids shall be backfilled with soil and compacted to establish continuous contact between the ground and product.
iii. If sediment reaches ½ of the log-type product height, the sediment shall be removed or a second log-type product may be positioned immediately upslope and in contact with the original log-type product.
iv. If a product rolls out of position, the product shall be repositioned and secured with additional stakes.
v. Holes, rips, or tears in the fabric of a log-type product less than 12 inches in any direction and located within the top 1/3 of the product may be repaired by stitching or wrapping a new piece of fabric around the product and securing. Sections of log-type product with holes, rips, or tears greater than or equal to 12 inches in any direction or located within the bottom 2/3 of the product shall be removed and replaced with new product or a second log-type product may be placed immediately upslope with a minimum 24 inches of overlap beyond the hole, rip, or tear.
vi. Pinched, settled, or deformed log-type products may be re-contoured to their original diameter by hand if possible or a second log-type product shall be placed immediately upslope with a minimum 24-inch overlap beyond the deformation.
vii. Destroyed or irreparable sections of log- type product shall be removed and replaced with new log-type product or a second log-type product may be placed immediately upslope with a minimum 24-inch overlap beyond the deformation.

5.5 Sand Bags

1. Conditions Where This Practice Applies
    A. This practice is applicable to the location of all culvert pipes draining runoff from disturbed areas.
4. Criteria
    A. Design
        i. Specify installation of sand/rock bag culvert pipe checks at any existing or proposed culvert pipe (inlet end) within disturbed area or where potential exists for disturbed area to flow through culvert.
        ii. Sand/rock bags are weather independent practice and may be specified during growing or non-growing seasons.
    B. Inspection/Installation
        i. Install sand/rock bag culvert pipe checks as the plans show and as the engineer/inspector directs. Place bags immediately after installing new culverts and before beginning earth disturbing activities in areas drained by existing culverts. Place bags on the inlet end of the culvert only. Leave bags in place until slopes and ditches are stable and turf develops enough to make future erosion unlikely. Periodically remove sediment to maintain effective function. Remove and dispose of the bags and rock filler when they are no longer needed to control erosion. Dispose of accumulated sediment and restore the site. The contractor may spread accumulated sediment to a surface suitable for seeding.
        ii. Materials
            a. Sand Bags:
                (a) Furnish bags made of canvas, burlap, nylon, or other engineer-approved material filled with concrete sand or other engineer-approved granular material.
            b. Rock Bags:
                (a) Furnish rock bags made of a porous, ultraviolet resistant, high-density polyethylene or geotextile fabric that will retain 70% of its original strength after 500 hours of exposure according to ASTM D 4355 and a minimum in-place filled size of 24-inches long by 12-inches wide by 6-inches high.
                (b) Fill the bags with a clean, sound, hard, durable, engineer-approved coarse aggregate conforming by visual inspection to the gradation specified for No. 2 coarse aggregate.
    C. Considerations
        i. The best way to prevent sediment from entering the culvert is to stabilize the disturbed area as quickly as possible, preventing erosion and stopping sediment transport at its source.
        ii. Sand/rock bag culvert pipe checks are only as effective so long as they are properly maintained. Periodic sediment removal is key in allowing the checks to remain effective.

iii. Documentation of materials used, monitoring logs, project diary and weekly inspection forms, including erosion and storm water management plans, should be turned over to the authority charged with long term maintenance of the site.

D. Operation and Maintenance
   i. Remove rock/sand bags once the contributing drainage area is stabilized with appropriate vegetation or impervious area.
   ii. Rock/sand bags shall be at a minimum inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.
   iii. Sediment deposits shall be removed and the rock/sand bags restored to original dimensions when the sediment has accumulated between 1/3 to ½ the design depth of the rock/sand bags, or when the device is no longer functioning as designed. Removed sediment shall be deposited in a suitable area and stabilized.
   iv. Due care shall be taken to ensure sediment does not impede the intended function of the culvert. Any material accumulating into the culvert shall be removed and deposited in a suitable area and stabilized.

5.6 Ditch Check

1. Conditions Where this Practice Applies
   A. This practice applies where grading activity occurs in areas of channelized flows and a temporary measure is needed to control erosion of the channel until permanent stabilization practices can be applied. Under no circumstance shall ditch checks be placed in intermittent or perennial stream without permission from WDNR. This practice may not be substituted for major perimeter trapping measures.
2. Criteria
   A. Design
      i. Ditch check is a weather independent procedure and may be specified during growing or non-growing seasons.
      NOTE: Specification of ditch checks that are required to be entrenched during frozen soil conditions may prove ineffective. Designers shall use discretion to ensure the item specified will serve the intended purpose in frozen soils.
      ii. Specify installation of ditch check in a channel within the following:
         a. Disturbed area where soil will not be stabilized for a long period of time (a week or more), or,
         b. Where disturbed area may be conveyed to or through, or,
         c. With erosion matting near natural resources such as a wetland or waterway for extra protection of potential erosion runoff.
         d. At a minimum, install one ditch check for every two feet of drop in the channel.
   B. Inspection/Installation
      i. Height

a. Installed, the minimum height of ditch checks shall be 10 inches and shall not exceed a maximum height of 16 inches for manufactured or biodegradable materials, and 36 inches for stone (or other inorganic materials).
b. Ditch checks must be installed with the center lower than the sides forming a weir. If this is not done, storm water flows are forced to the edge of the ditch check thus promoting scour, or, out of the channel causing excessive erosion. (See Appendix 5 Temporary Ditch Checks)
c. Stone ditch checks shall have a minimum top width of 2 feet measured in the direction of flow with maximum slopes of 2:1 (2 horizontal to 1 vertical) on the upslope side and 2:1 on the down slope side. (See Appendix 6 Stone Ditch Check)

ii. Placement
a. Install ditch check as the plans show and as the engineer/inspector directs.
b. At a minimum, install one ditch check for every two feet of drop in the channel.
c. Ditch checks shall be placed such that the resultant ponding will not cause inconvenience or damage to adjacent areas.

iii. Material Specification
a. Stone ditch checks shall be constructed of a well-graded angular stone, a D50 of 3 inch or greater, sometimes referred to as breaker run or shot rock.
b. Ditch checks may be constructed of other approved materials, but must be capable of withstanding the flow velocities in the channel. Additional products listed in WisDOT's PAL are also acceptable for temporary ditch checks upon approval of the Environmental Department.
c. Silt fence and single rows of straw bales are ineffective as ditch checks and are not permitted.

iv. Installation – Refer to Appendices 5 & 6 at the end of this work practice.
a. Ditch checks shall be utilized during rough grading and shall be removed once the final grading and channel stabilization is applied, unless intended to be part of a permanent storm water management plan.
b. Channel erosion mat or other non-erodible materials shall be placed at the base of a ditch check, and extended a minimum of 6 feet, to prevent scour and washing out the toe of the ditch check. WP 1371-WPS Erosion Mats contains criteria for the placement of erosion mat in this location.
c. Chink or seal stone and rock ditch checks to minimize the flow through the ditch check.

C. Considerations

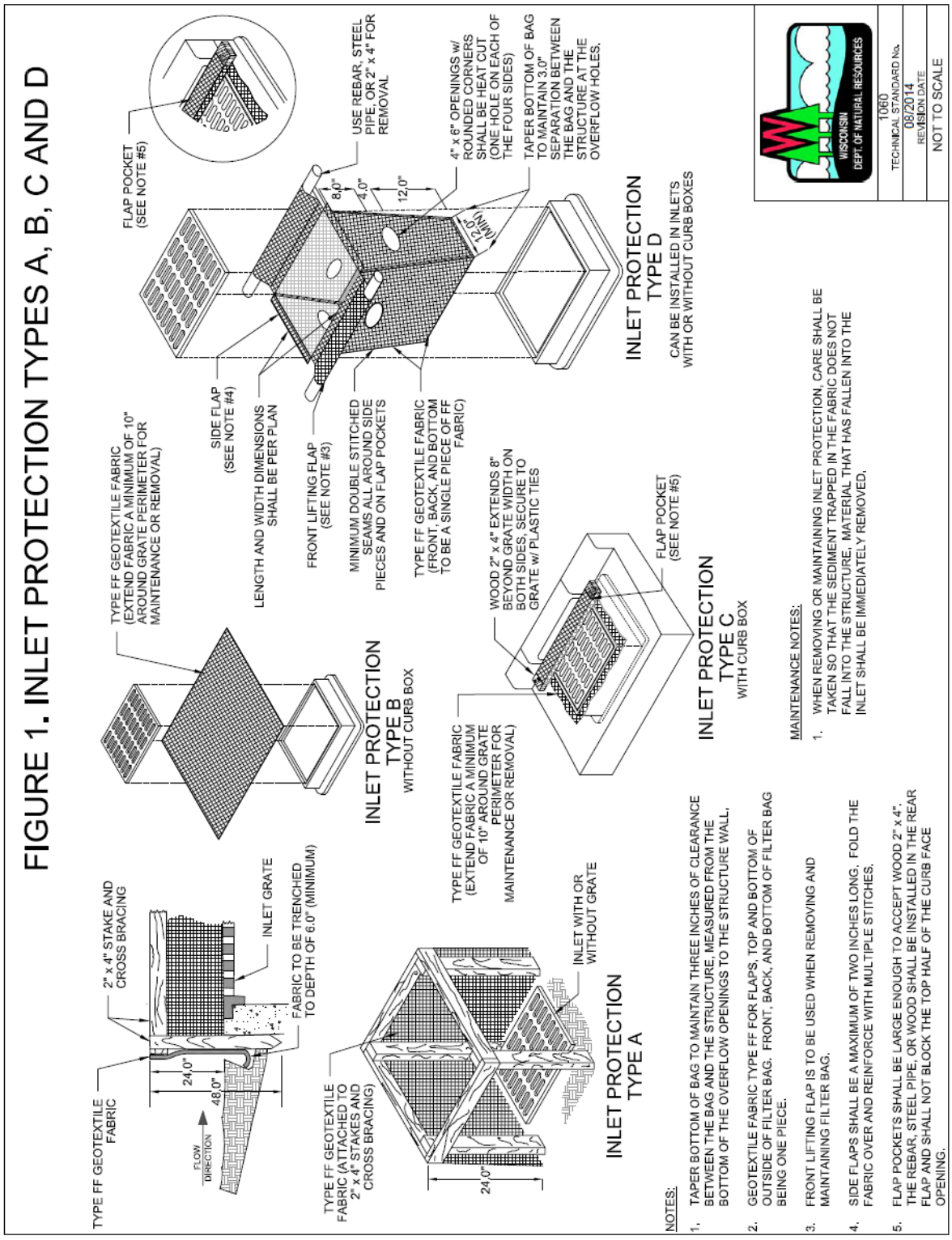
i. For added stability, the base of a stone or rock ditch check should be keyed into the soil to a depth of 6-inches.
ii. Stone ditch checks may be underlain by a nonwoven geotextile fabric to ease installation and removal. If the geotextile fabric is extended, it can serve purpose specified in section 5.6(2)(B)(iv)(b).
iii. Ditch checks installed in grass lined channels may kill the vegetation if water is ponded for extended periods or excessive siltation occurs. Proper maintenance is required to keep areas above and below the ditch check stabilized.
iv. The best way to prevent sediment from entering the storm sewer system is to stabilize the disturbed area of the site as quickly as possible, preventing erosion and stopping sediment transport at its source.
v. When placing ditch checks in swales adjacent to roadways, consider designating a 'clear zone' free of obstacles posing a threat to out of control vehicles.
vi. Mowing operations may throw stones from ditch checks causing a potential safety hazard.

D. Operation and Maintenance
i. Ditch checks shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period until disturbed area is stabilized and permit terminated (if applicable).
ii. Unless incorporated into a permanent storm water management system, ditch checks shall be removed once the final grading and channel stabilization is applied.
iii. Sediment deposits shall be removed when deposits reach ½ the height of the barrier. Removal of sediment may require replacement of stone. Maintenance shall be completed as soon as possible with consideration to site conditions.

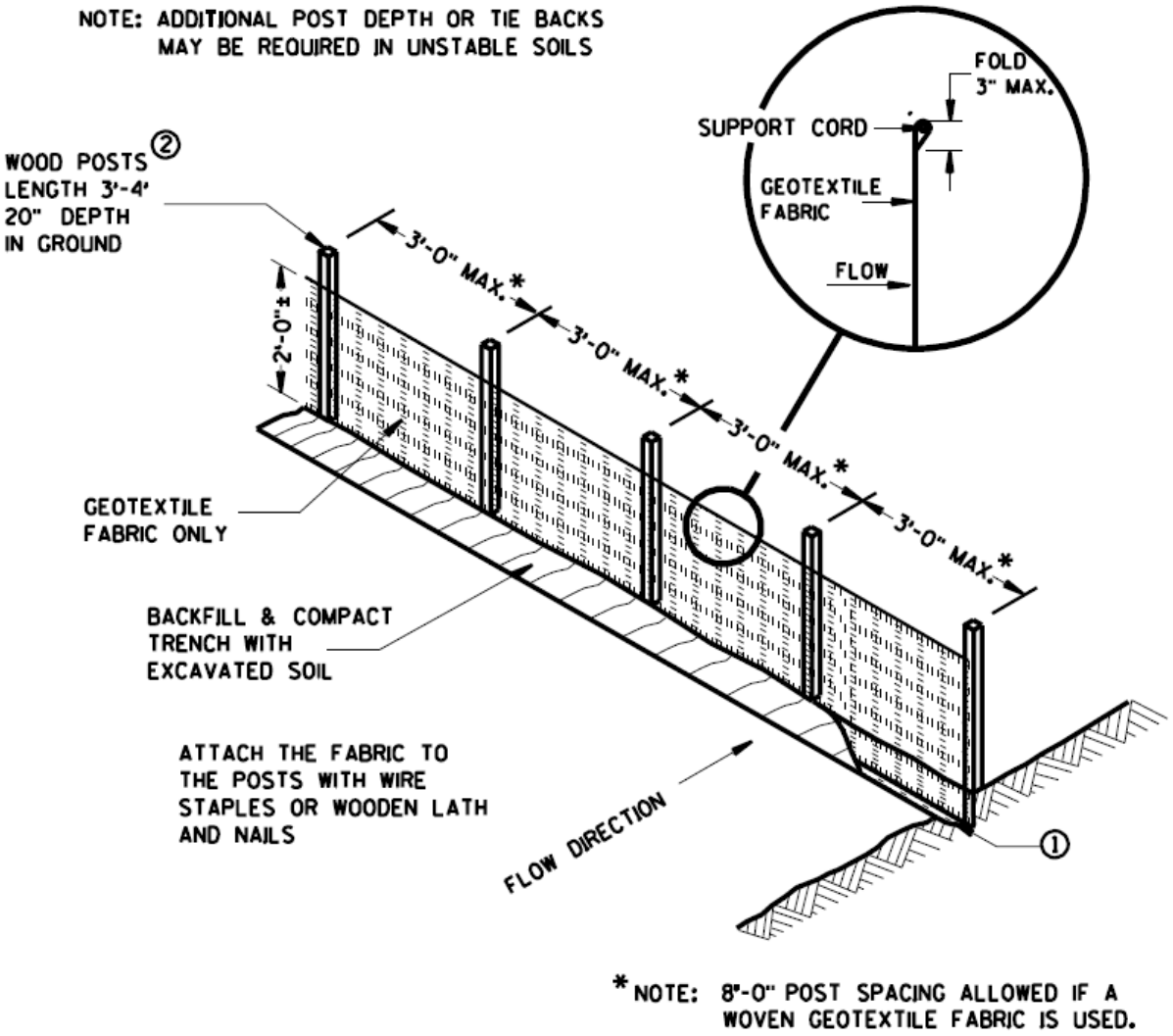
6.0 ASSOCIATED TOOLS AND EQUIPMENT

1. Silt Fence, 100 ft. roll w/stakes, Stock Code #1512600
2. Straw Bales are Non-Stock
3. Stakes
   A. 3' long, Stock Code #1347302
   B. 4' long, Stock Code #1347304

Appendix 1 Catch Basin Inlet Protection

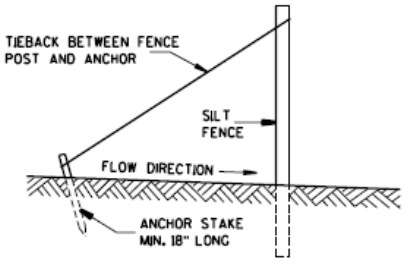


Appendix 2 Silt Fence

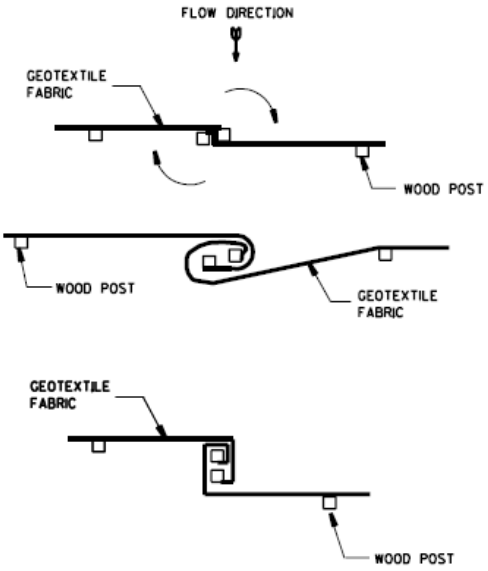


SILT FENCE

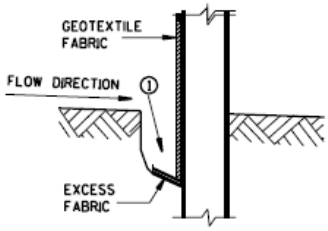
Appendix 3 Silt Fence Tie Back and Joining Methods



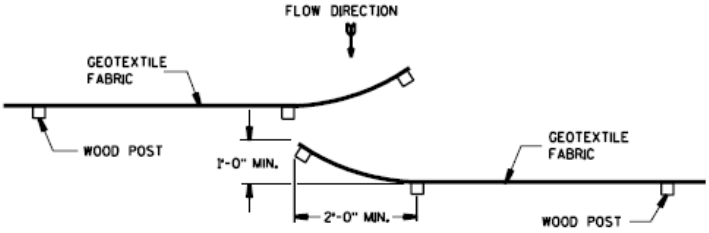
SILT FENCE TIE BACK
(WHEN ADDITIONAL SUPPORT REQUIRED)



TWIST METHOD



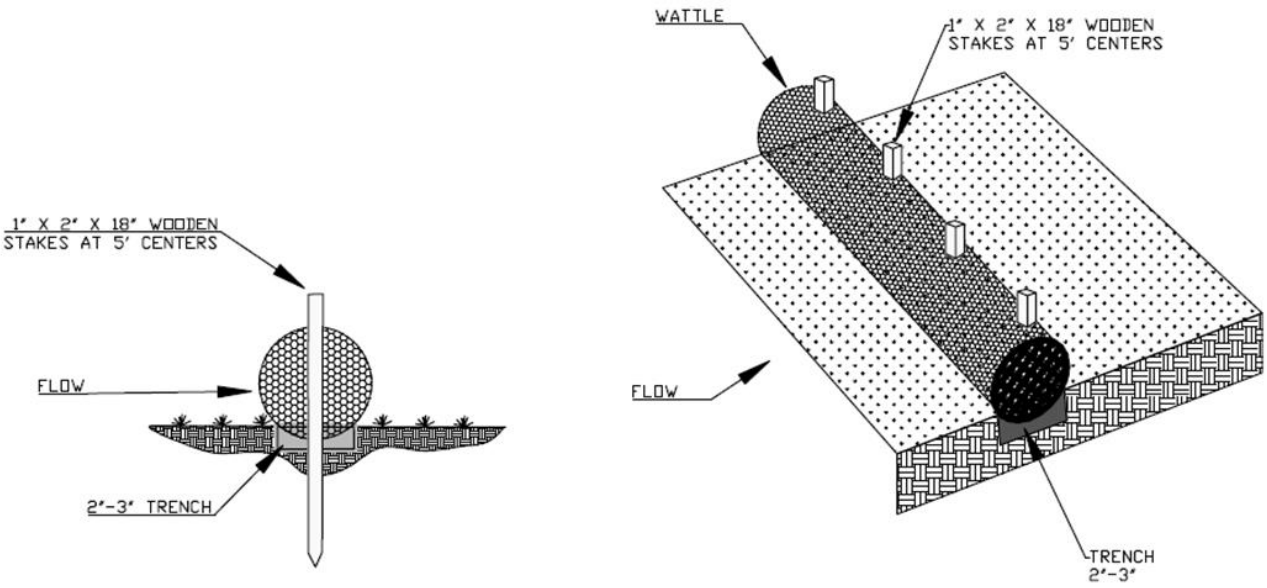
TRENCH DETAIL



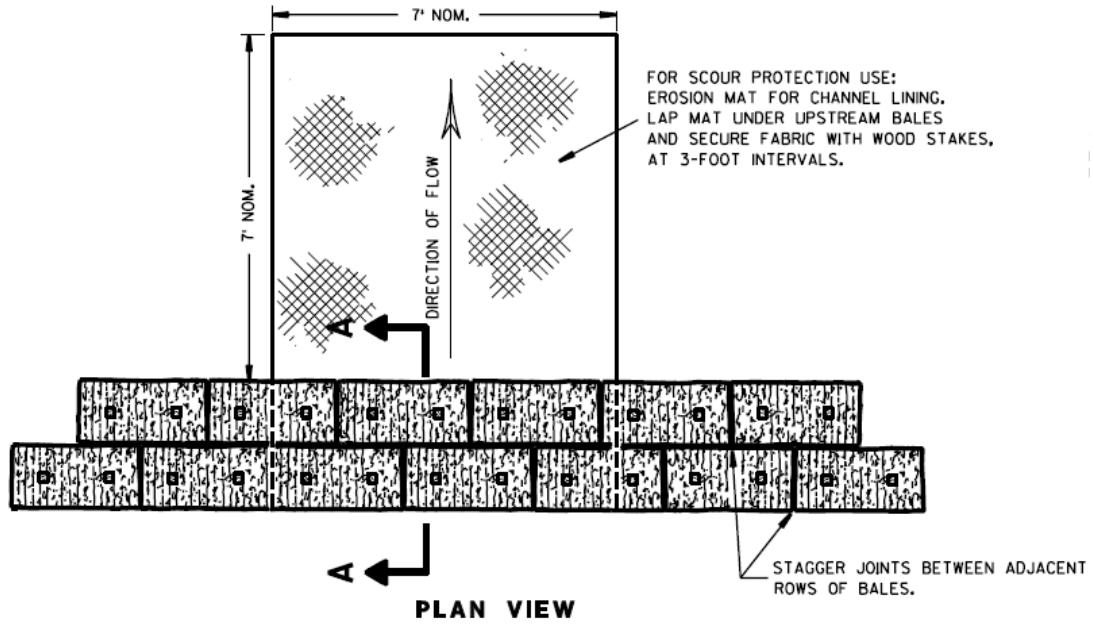
HOOK METHOD

JOINING TWO LENGTHS OF SILT FENCE ④

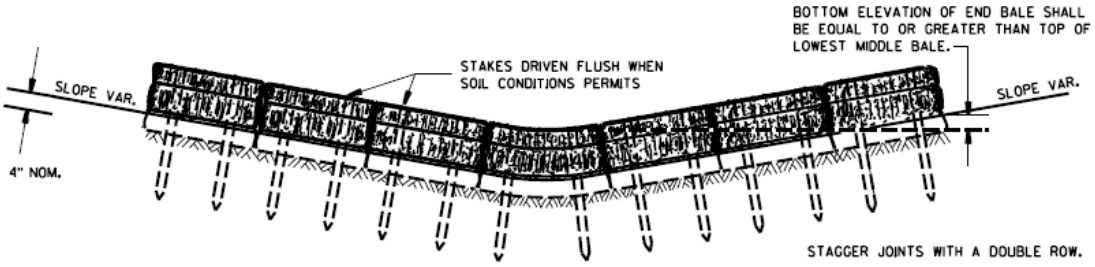
Appendix 4 Straw Wattle Typical



Appendix 5 Temporary Ditch Check Using Erosion Bales

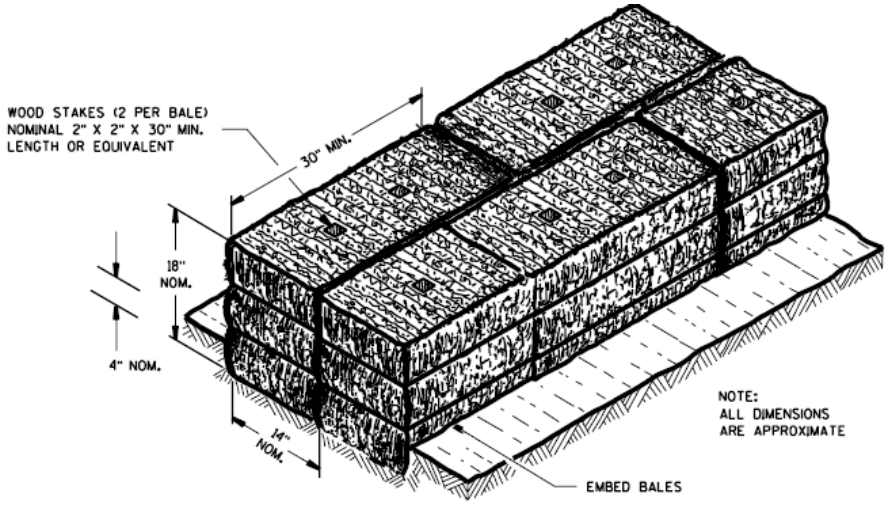


PLAN VIEW



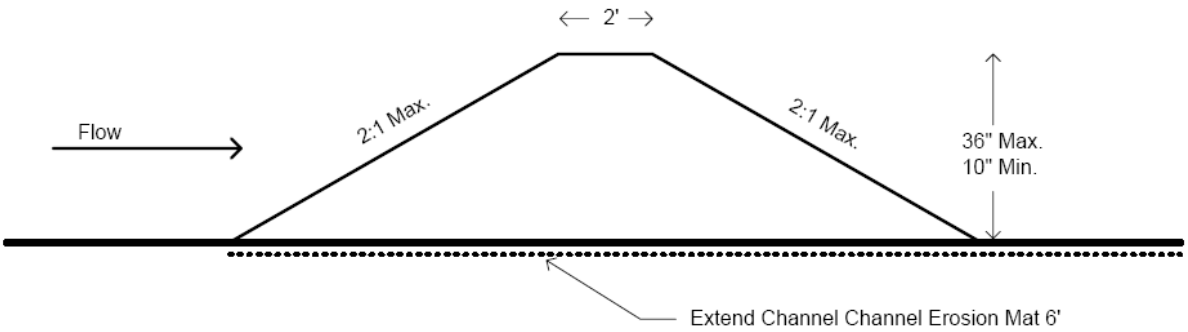
FRONT ELEVATION

TEMPORARY DITCH CHECK USING EROSION BALES ①

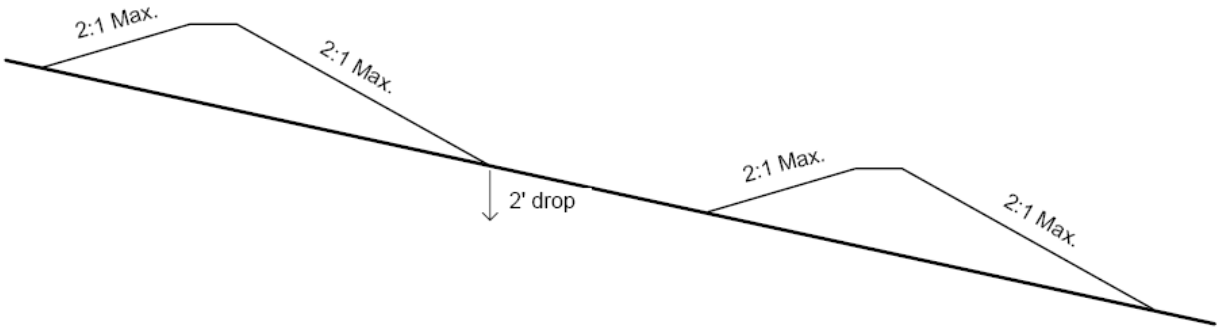


SECTION A-A

Appendix 6 Stone Ditch Check



Side View



Side View

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Appendix G-4

Example

Restoration - Mulching, Seeding and Sod

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Gas Work Practice

WP 1375-WPS: Restoration – Mulching, Seeding and Sod

Revision 1.0
4/29/2016

Table of Contents

1.0 PURPOSE

The purpose of this work practice is to reduce erosion and stabilize disturbed areas both temporarily and permanently.

2.0 SCOPE AND APPLICABILITY

WPS may disturb existing vegetation, which when unprotected, may result in unnecessary erosion to the existing features and potentially discharge sediment from the construction area. Implementation of the following is to reduce erosion and stabilize disturbed areas both temporarily and permanently.

As used in this work practice, these words are defined as follows:[1]

1. Shall, will and must are used interchangeably and are used to express an action that is mandatory,
2. Should is used to express an action that is a preferred practice,
3. May and can are used to express an action that is optional.

3.0 GENERAL NOTES AND PRECAUTIONS

This work practice has been derived from the Wisconsin Department of Natural Resources Technical Standards.

4.0 DEFINITIONS

1. Mulching: The application of organic material to the soil surface to protect it from raindrop impact and overland flow. Mulch covers the soil and absorbs the erosive impact of rainfall and reduces the flow velocity of runoff.
2. Permanent Seeding: Seeding which produces perennial vegetation. Permanent Seeding is used in areas where permenant vegetation is desired.
3. Seeding: Planting seed to establish temporary or permanent vegetation for erosion control.
4. Temporary Seeding: Seeding which produces annual vegetation. Temporary Seeding is used in areas where temporary vegetation is desired.

5.0 PROCEDURE

5.1 Mulching

1. This practice may be applied on exposed soils as a temporary control where soil grading or landscaping has taken place or in conjunction with temporary or permanent seeding. Mulching is generally not appropriate in areas of concentrated flow.
2. Installation
    A. Mulching may be installed after each work day for temporary purposes as appropriate and in sequence with permanent seeding within 7 days of final grading. Mulch shall be applied at a uniform rate of 1½ to 2 tons per acre for sites that are seeded, and 2 to 3 tons per acre for sites that are not seeded and in accordance with WDNR Technical Standard 1058 Mulching for Construction Sites.

[1] Definitions are common to AGA and other similar sources

B. Mulch shall be anchored at the time of application or immediately after application using mechanical or chemical means specicified in WDNR Technical Standard 1058.

3. Maintenance
   A. Mulch shall, at a minimum, be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.
   B. Additional mulch shall be applied immediately when necessary to maintain suitable coverage. Inspections shall be made until vegetative cover is well established.

5.2 Seeding

1. Seeding applies to areas of exposed soil where the establishment of vegetation is desired. Temporary seeding applies to disturbed areas that will not be brought to final grade or on which land-disturbing activities will not be performed for a period greater than 30 days, and requires vegetative cover for less than one year. Permanent seeding applies to areas where perennial vegetative cover is needed.
2. Seeding should be done in accordance with WDNR Technicial Standard 1059 Seeding for Construction Site Erosion Control.
3. Installation
   A. Seed shall be installed within 7 days of final grading and in conjunction with other practices.
   B. Other appropriate and essential practices such as fertilizer, inoculum, soil amendments, and cover crop shall also be done in conjunction with the planting.
   C. The planting shall consist of seeding and may include cuttings, plugs, stems, ball and burlap, willow mattresses, fascines, or other commonly accepted plant materials. At a minimum, perennial seed mixture shall be utilized.
   D. Seeding may not be considered acceptable vegetative cover until the vegetative cover is well established.
4. Maintenance
   A. Seeded areas shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period until disturbed area is stabilized and permit terminated (if applicable).
   B. Repair and reseed areas that have erosion damage as necessary.

5.3 Sod

1. Sod should be used to immediately stabilize high risk or high priority areas. Sodding may be used in place of seeding and as a filter strip along the shoreline. The sod protects the soil surface from erosion by reducing velocities and raindrop impact and also traps sediments. This practice applies in stabilization area where cut banks, grading, excavations and other disturbances have laid bare the soil, or where special needs arise, as in the case of aesthetics.
2. Installation
   A. The sod shall be installed within 7 days of final grading.
   B. The sod shall be moist and should be placed within 2 days of cutting.

C. The sod shall be placed at right angles to the direction of flow. Placement shall progress from downslope to upslope. Joints shall be staggered as in laying bricks. The upper edge of sod shall be turned down slightly to conduct water onto the sod, edges may be overlapped, and all sod shall be staked to hold it in place.

3. Maintenance
   A. Sodded areas shall be inspected within 24 hours after a rainfall event or daily during periods of prolonged rainfall until the sod is well rooted. Repair or replacement shall be made immediately.

6.0 ASSOCIATED TOOLS AND EQUIPMENT

1. Seed, Lawn Premium Mixtures, Stock Code #151-3400
2. Seed, Mulch Cover, Stock Code #151-3402

Appendix G-5

Example

Frac Out Response plan and Report Form

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Gas Work Practice

WP 1376-WPS: Frac-Out Response Plan and Report Form

Revision 1.0
4/29/2016

Table of Contents

List of Appendices

1.0 PURPOSE

The purpose of this work practice is to outline the required frac-out response plan for boring activities.

2.0 SCOPE AND APPLICABILITY

Procedure for implementing a response plan for the inadvertent release of drilling mud during boring activities.

As used in this work practice, these words are defined as follows:[1]

1. Shall, will and must are used interchangeably and are used to express an action that is mandatory,
2. Should is used to express an action that is a preferred practice,
3. May and can are used to express an action that is optional.

3.0 GENERAL NOTES AND PRECAUTIONS

There are no general notes and precautions that apply to this work practice.

4.0 DEFINITIONS

1. Frac-out: The inadvertent or un-controlled escape of drilling lubricant to the environment during any point of directional drilling operations.

5.0 PROCEDURE

5.1 Frac-Out Response Plan

1. Monitoring Requirements
   The installation crew will constantly monitor for any signs of a frac-out whenever there is boring, reaming, or pipe pulling activities. Monitoring should include walking and observing the bore route for indications of drilling fluid and monitoring the drilling pressures on the boring rig itself.
2. Immediate Response Required
   When a frac-out is identified, the bore crew must halt the bore immediately and begin containment efforts. Boring activities may not continue until it is verified that the frac-out is contained.
3. Containment Basics
   A. The boring installation crew will be expected to have containment materials and/or equipment onsite whenever directional boring is being conducted. This includes silt fence, sediment logs, straw bales, sand bags, and/or other temporary containment structures.
   B. When boring a waterway or wetland, vacuum excavation equipment must be readily available.
   C. When frac-outs occur in uplands they shall be contained so the drilling mud does not reach waterways, wetlands, or storm sewer inlets.

[1] Definitions are common to AGA and other similar sources

D. Crew members should review individual responsibilities for frac-out response as part of daily pre-job discussions and preparations.

4. Required Contacts
   A. The Environmental Department should be contacted if a frac-out is identified within a waterway, wetland, or storm sewer inlet.
   B. Federal, state, and local regulatory agencies may need to be contacted depending on the frac-out location. These contacts will be made by the Environmental Department.
5. Required Documentation
   A. All frac-outs must have the following information regarding the frac-out incident properly documented:
      i. An estimate of the amount of drilling mud released,
      ii. The method of containment used to control the frac-out,
      iii. The remediation methods used to clean-up the frac-out,
      iv. Other information regarding the frac-out (time, location, crew, etc).
6. Clean Up
   All frac outs will be cleaned up by removing as much of the drilling mud as practical while minimizing collateral impacts. In most cases, this will require a vacuum excavation truck.

6.0 ASSOCIATED TOOLS AND EQUIPMENT

1. Silt Fence, 100 ft. roll w/stakes, Stock Code #1512600
2. Straw Bales (non-stock)
3. Stakes:
   A. Stock Code #1347302, 3’ long
   B. Stock Code #1347304, 4’ long
4. Vacuum Excavation Truck

Appendix 1 Frac-Out Report

Model Frac-Out Report

General Information:

Address: _____ City / State / Zip Code: _____

Township: _____ County: _____

Date: _____ Time: _____ Foreman: _____ Operator: _____

Facility /Location Information:

☐ Steel ☐ Plastic Diameter/Size: _____

☐ Hard Surface ☐ Lawn/Parkway ☐ Water Crossing Impacted Quantity of Release: _____

Environmental Group Notification:

☐ None Required

☐ Required

Contact Name: _____ Time of Contact: _____

Containment Actions Taken:

☐ Vacuum Excavation ☐ Sand Bags ☐ Bales / Straw ☐ Other: _____

Comments:

_____

_____

_____

_____

Foreman: _____ Date: _____