



EROSION CONTROL TECHNICIAN REFERENCE MANUAL

2017



Erosion Control Technician – Course Syllabus

Day 1

9:00 to 9:15	Introduction
9:15 to 11:30	NPDES Permit and SWPPP requirements (includes break)
11:30 to 12:30	Lunch
12:30 to 3:00	Plans & Specifications (includes break)
3:00 to 4:00	BMPs: The Good, Bad, & Ugly

Day 2

9:00 to 10:30	Storm Water Inspections (includes break)
10:30 to 11:30	EPA Inspections
11:30 to 12:30	Lunch
12:30 to 1:30	Case Study/Class Exercise
1:30 to 2:00	Review (includes break)
2:00 to 4:00	Celebration of Knowledge (i.e. exam)

EROSION CONTROL TECHNICIAN DUTIES

Duties of the Erosion Control Technician consist of, but are not limited to the following:

- A. Carefully review and be familiar with the details in the contract documents.
 - B. Assign erosion and sediment control monitoring responsibilities to Erosion & Sediment Control (ESC) Basics trained field staff.
 - C. Review copies of storm water inspection reports.
 - D. Provide input on initial Erosion Control Implementation Plan (ECIP) submittal and ECIP updates.
 - E. Provide onsite reviews when requested by Contracting Authority or Contractor field staff.
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FEDERAL CODE 1020 and IOWA CODE 714.8

I.M. 213 discusses the Unsatisfactory Notice that Certified Technicians are given when they are not performing their job duties satisfactorily. This can be given for a number of reasons including, improper sampling and/or testing, not performing their duties and reporting in the time frame required, reporting incorrect information, etc. The technician is given one written notice, the second notice is three-month certification suspension, and the third notice is decertification. According to I.M. 213 the Certified Technician can automatically be decertified for false statements without going through the Unsatisfactory Notice procedure. The Certified Technician also needs to be aware of the false statement clause that is applicable to all federal-aid projects and the fraudulent practice clause that applies to all non-federal aid projects. **Certified Technicians need to read and be aware of U.S.C. 1020 and Iowa Code 714.8 since these do apply to them.** They read as follows:

FEDERAL AID PROJECTS

IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

NOTICE TO ALL PERSONNEL ENGAGED ON FEDERAL-AID HIGHWAY PROJECTS 18 U.S.C. 1020 reads as follows:

“Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in

connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more than \$10,000 or imprisoned not more than 5 years or both”

NON-FEDERAL AID PROJECTS

Iowa Code 714.8, subsection 3, defines fraudulent practices. “A person who does any of the following acts is guilty of a fraudulent practice. Subsection 3, Knowingly executes or tenders a false certification under penalty of perjury, false affidavit, or false certificate, if the certification, affidavit, or certificate is required by law or given in support of a claim for compensation, indemnification, restitution, or other payment.” Depending on the amount of money claimed for payment, this could be a Class C or Class D felony, with potential fines and/or prison.

The above codes refer to the individual making the false statement. **Standard Specification Article 1102.03, paragraph C. section 5 refers to the Contractor.**

Article 1102.03, paragraph C, section 5 states, “A contractor may be disqualified from bidder qualification if or when: The contractor has falsified documents or certifications, or has knowingly provided false information to the Department or the Contracting Authority.”

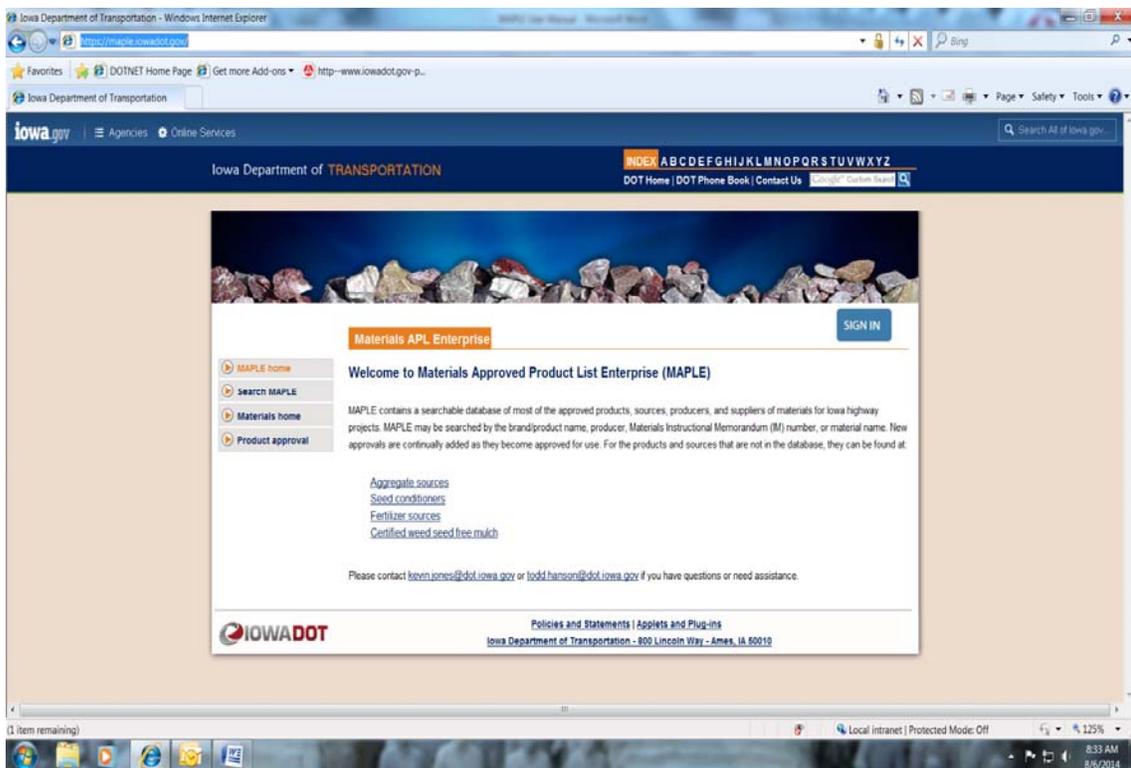
User's Guide for Materials Approved List Enterprise (MAPLE)

1. Introduction

Iowa DOT Materials Approved List Enterprise (MAPLE) has been in service for all users since July 2014. The MAPLE allows user to check all products approved in Iowa from a single data base. This document is to provide an instruction on how to use the MAPLE.

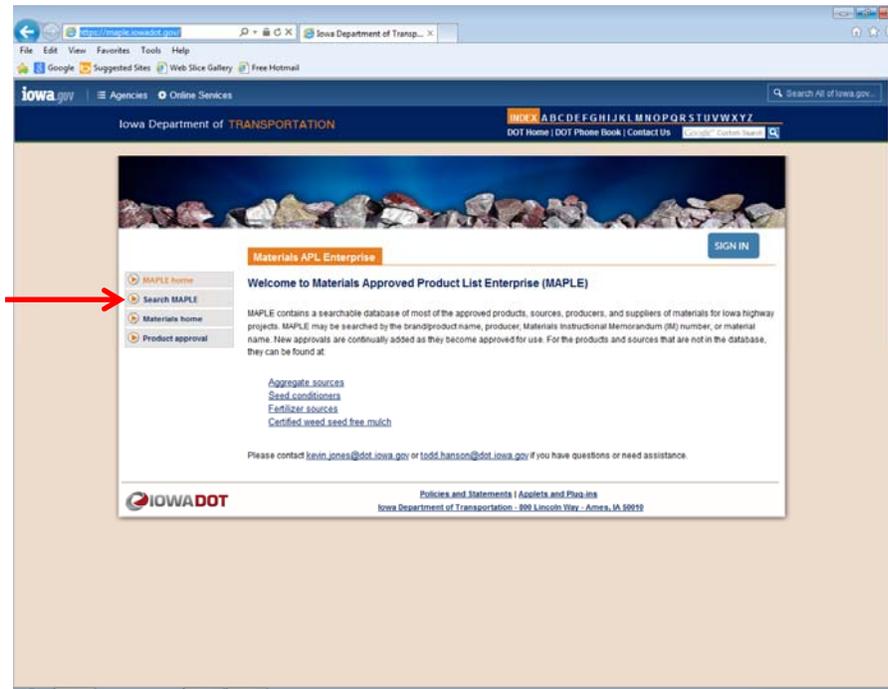
2 How to get to MAPLE

The MAPLE can be reached at: <https://maple.iowadot.gov/>
The Sign IN is only for editing purposes.

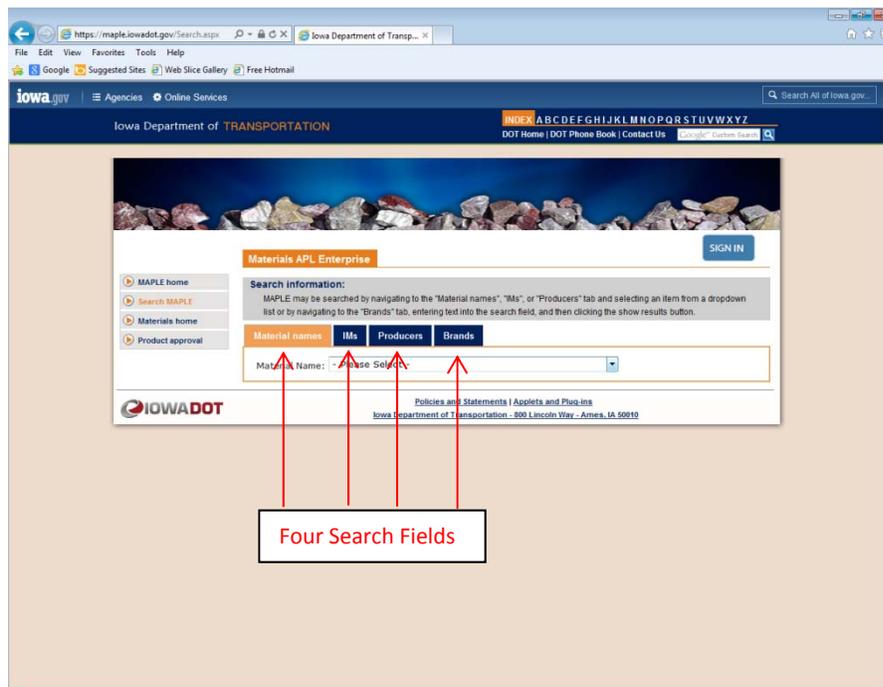


3. Searching MAPLE

Click on the field of **Search Maple** as shown in Screen 2.

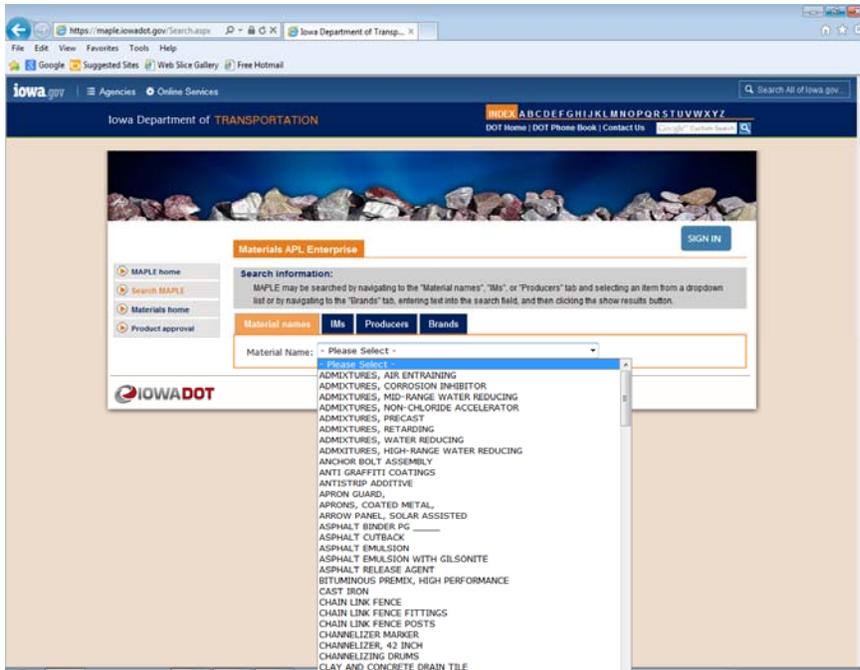


The user can search **MAPLE** through one of four fields listed: **Material Names, IMs, Producers, and Brands.**



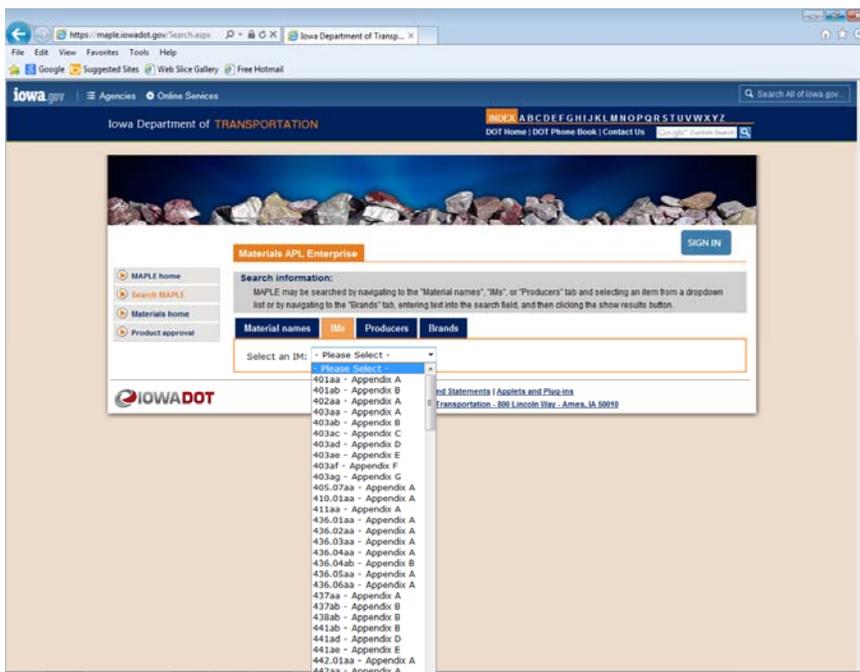
4. Search by Material Names

Click on the Material Names tab to search by material. Click on the arrow  a list appears as shown. Click on any of the names listed to produce a list of that product.



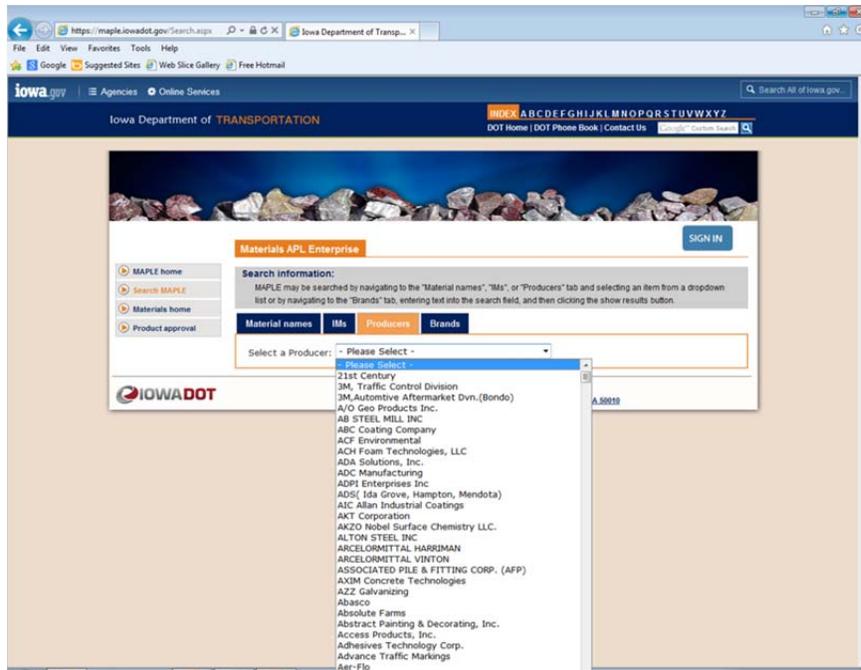
5. Searching by IMs

Click on the IMs tab to search by IM number. Click on the arrow  a list appears as shown. Click on any of the IM's listed to produce a list of products on that IM.



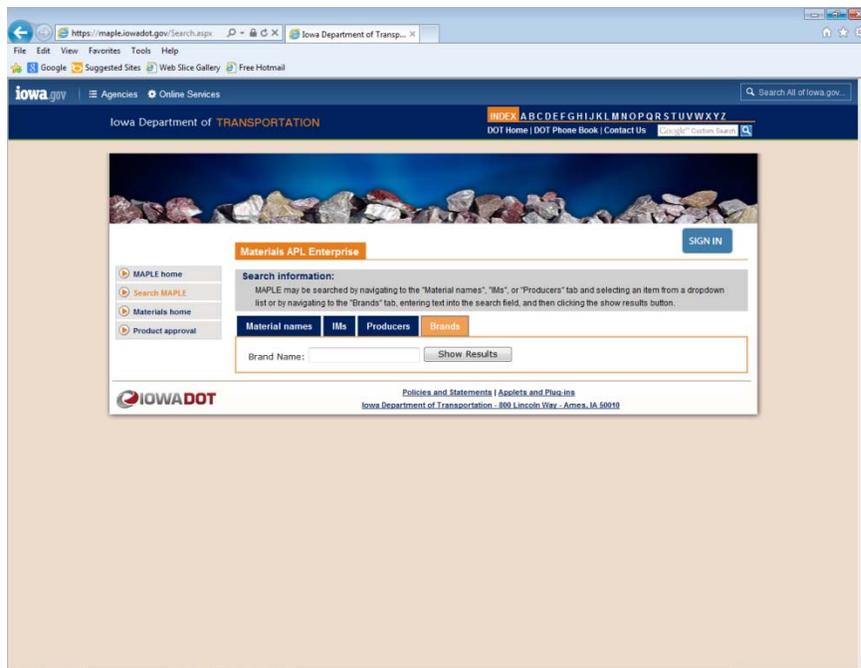
6. Searching by Producers

Click on the Producers tab to search by producer. Click on the arrow  a list appears as shown. Click on any producer for a list of all products manufactured by that particular producer.



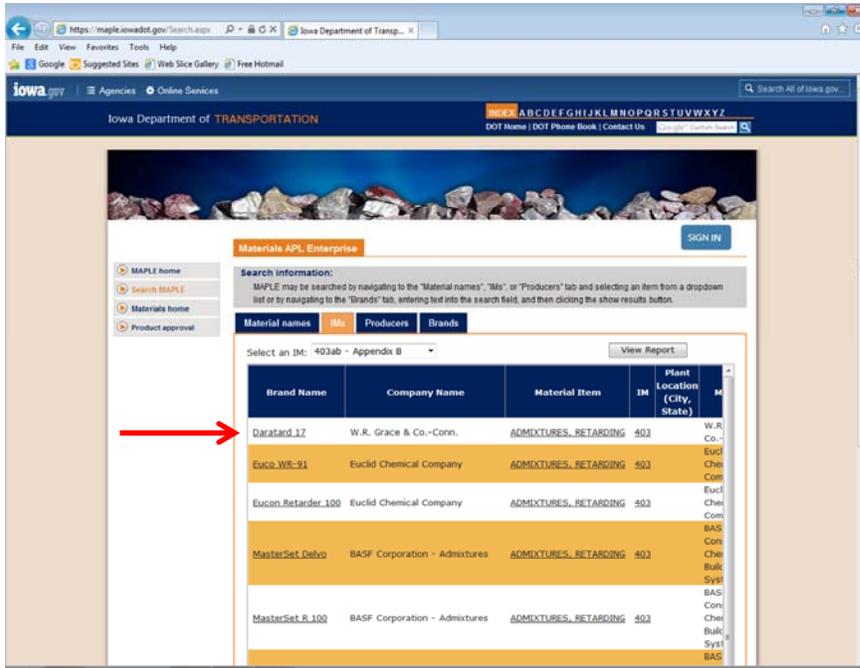
7. Searching by Brand Name

Searching by brand name allows the user to freeform type the name of the product.



8. Selecting a Product

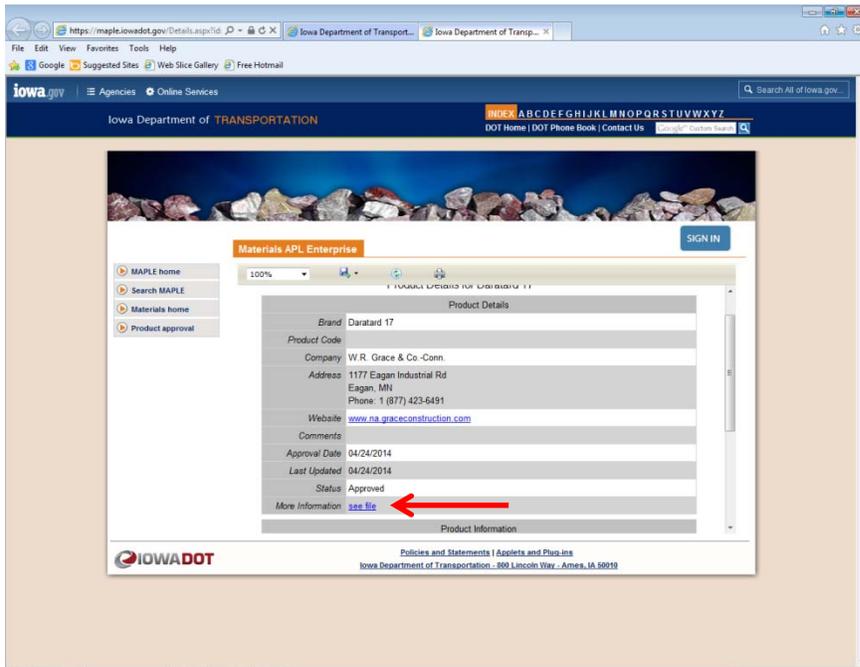
After a list of products has been displayed, click on the individual Brand Name to display more information about the product.



The screenshot shows the MAPLE search results page. The search information indicates that the results are for '403ab - Appendix B'. The table below lists several materials, with the first row highlighted in orange. A red arrow points to the 'Daratard 17' brand name in the first row.

Brand Name	Company Name	Material Item	IM	Plant Location (City, State)
Daratard 17	W.R. Grace & Co.-Conn.	ADMIXTURES, RETARDING	403	W.R. Co.-
Euco WR-91	Euclid Chemical Company	ADMIXTURES, RETARDING	403	Eucl Che Com
Eucon Retarder 100	Euclid Chemical Company	ADMIXTURES, RETARDING	403	Eucl Chei Com
MasterSet Delvo	BASF Corporation - Admixtures	ADMIXTURES, RETARDING	403	BAS Com Chei Bulk Syst
MasterSet R 100	BASF Corporation - Admixtures	ADMIXTURES, RETARDING	403	BAS Com Chei Bulk Syst BAS

More information regarding the product will be displayed on the following screen. A few IM's will have additional info on a *.pdf file. Click on [see file](#) to display more information.



The screenshot shows the product details page for 'Daratard 17'. The page displays the following information:

- Brand: Daratard 17
- Product Code: [Redacted]
- Company: W.R. Grace & Co.-Conn.
- Address: 1177 Eagan Industrial Rd, Eagan, MN
- Phone: 1 (877) 423-6491
- Website: www.wr.graceconstruction.com
- Comments: [Redacted]
- Approval Date: 04/24/2014
- Last Updated: 04/24/2014
- Status: Approved
- More Information: [see file](#)

A red arrow points to the 'see file' link under the 'More Information' section.

A pdf with the additional information will appear after clicking on [see file](#). Additional info may be found on the following IM's: 403ab, 445.01ab, 451ad, 455.02aa, 455aa, 462aa, and 557ab.

April 15, 2014
Supersedes April 17, 2013

Matis IM 403
Appendix B

APPROVED SOURCES
RETARDING, AND WATER REDUCING & RETARDING
ADMIXTURES FOR BRIDGE DECK AND DRILLED SHAFT
CONCRETE WHEN EXTENDED WORKING TIME IS REQUIRED

GUIDELINES FOR DOSAGE RATES WITH ANTICIPATED WORKING TIME LIMITS

- Dosage is in fluid ounces per 100 lbs. (mL/kg) of cement, fly ash, and ggbs.
- Check percent of air as retarding admixtures tend to increase air contents

Working time limits for various cements with NO RETARDER

Mix Temp at point of discharge	Dosage	Type III, no fly ash	Type III with fly ash	Type IS, IP with fly ash*
°F °C	fl. oz./cwt	hours	hours	hours
50 10	0	3.0	4.0	5.0
65 18	0	3.1	3.8	4.6
75 24	0	2.5	3.0	3.5
85 29	0	2.2	2.5	2.7
90 32	0	1.9	1.9	1.9

Including Type III with slag and fly ash

Working time limits for various cements with Plustring

Mix Temp at point of discharge	Dosage	Type III, no fly ash	Type III with fly ash	Type IS, IP with fly ash*
°F °C	fl. oz./cwt	hours	hours	hours
50 10	2.0			
	3.0			
	4.0			
	5.0			
65 18	3.0	5.1	5.8	6.6
	4.0	7.1	7.8	8.7
	5.0	11.4	12.0	13.0
	6.0	20.2	20.8	21.8
75 24	3.0	3.6	4.0	4.2
	4.0	4.7	5.1	5.4
	5.0	6.9	7.4	7.8
	6.0	10.9	11.6	12.1
	7.0	18.9	19.3	20.5
85 29	3.0	3.0	3.3	3.1
	4.0	3.6	3.8	3.0
	5.0	4.9	5.1	5.1
	6.0	6.9	7.1	7.2
	7.0	10.2	10.5	10.3
90 30	3.0	2.2	2.2	2.2
	4.0	2.7	2.7	2.7
	5.0	3.5	3.5	3.5
	6.0	4.9	4.9	4.9
	7.0	7.4	7.4	7.4
	8.0	12.1	12.1	12.1

Clicking on View Report will display a listing that will enable the user to either print or export the list to Excel, Word, or a pdf file.

Materials Approved Products List
IM 403ab - Appendix B

Brand Name	Company Name	Material Item	IM	Plant Loc
Daratard 17	W.R. Grace & Co.-Conn.	ADMIXTURES, RETARDING	403	
Evco WR-91	Euclid Chemical Company	ADMIXTURES, RETARDING	403	
Evcon Retarder 100	Euclid Chemical Company	ADMIXTURES, RETARDING	403	
MasterSet Delvo	BASF Corporation - Admixtures	ADMIXTURES, RETARDING	403	
MasterSet R 100	BASF Corporation - Admixtures	ADMIXTURES, RETARDING	403	

PPP & NPDS PERMIT

Sample PPP

Spreadsheet

Copy of Permit: Effective 10/1/12 to 10/1/17

Sample Authorization

POLLUTION PREVENTION PLAN

This project is regulated by the requirements of the Iowa Department of Natural Resources (IDNR) National Pollutant Discharge Elimination System (NPDES) General Permit No. 2 OR an Iowa Department of Natural Resources (IDNR) National Pollutant Discharge Elimination System (NPDES) Individual storm water permit. The Contractor shall carry out the terms and conditions of this permit and the Pollution Prevention Plan (PPP).

This Base PPP includes information on Roles and Responsibilities, Project Site Description, Controls, Maintenance Procedures, Inspection Requirements, Non-Storm Water Controls, Potential Sources of Off Right-of-Way Pollution, and Definitions. This plan references other documents rather than repeating the information contained in the documents. A copy of this Base Pollution Prevention Plan, amended as needed per plan revisions or by contract modification, will be readily available for review.

All contractors shall conduct their operations in a manner that controls pollutants, minimizes erosion, and prevents sediments from entering waters of the state and leaving the highway right-of-way. The prime contractor shall be responsible for compliance and implementation of the PPP for their entire contract. This responsibility shall be further shared with subcontractors whose work is a source of potential pollution as defined in this PPP.

I. ROLES AND RESPONSIBILITIES

- A. Designer:
 1. Prepares Base PPP included in the Project plan.
 2. Prepares Notice of Intent (NOI) submitted to Iowa DNR.
 3. Signature authority on the Base PPP and NOI.
- B. Contractor:
 1. Affected contractors/subcontractors are co-permittees with the IDOI and will sign a certification statement adhering to the erosion controls or involved in land disturbing activities. All co-permittees are legally required under the Clean Water Act and the Iowa Administrative Code to ensure compliance with the terms and conditions of this PPP.
 2. Submit an Erosion Control Implementation Plan (ECIP) according to Specifications Section 2602 and any additional plan notes.
 3. Install and maintain appropriate controls.
 4. Supervise and implement good housekeeping practices.
 5. Conduct joint required inspections of the site with inspection staff.
 6. Comply with training and certification requirements of Specifications Section 2602.
- C. RCE/Inspector:
 1. Update PPP whenever there is a change in design, construction, operation or maintenance, which has a significant effect on the erosion control plan.
 2. Maintain an up-to-date record that identifies contractors and subcontractors as co-permittees.
 3. Make plans available to the DNR upon their request.
 4. Conduct joint required inspections of the site with the contractor/subcontractor.
 5. Complete an inspection report after each inspection.
 6. Signature authority on storm water inspection reports and Notice of Discontinuation (NOD).

III. PROJECT SITE DESCRIPTION

- A. This Pollution Prevention Plan (PPP) is for the construction of a "Describe Type Of Facility".
- B. This PPP covers approximately "Provide # Of Acres" acres with an estimated "Provide # Of Acres" acres being disturbed. The portion of the PPP covered by this contract has "Provide # Of Acres" acres disturbed.
- C. The PPP is located in an area of "Provide # Of Types Of Soil Association" soil association ("Provide Soil Association Type 0# Types"). The estimated weighted average runoff coefficient number for this PPP after completion will be "Provide runoff coefficient number".
- D. Storm Water Site Map - Multiple sources of information comprise the base storm water site map including:
 1. Drainage patterns - Plan and Profile sheets and Situation plans.
 2. Proposed Slopes - Cross Sections.
 3. Areas of Soil Disturbance - construction limits shown on Plan and Profile sheets.
 4. Locations of Structural Controls - Tabulations on C sheets.
 5. Locations of Non-Structural Controls - Tabulations on C sheets.
 6. Locations of Stabilization Practices - Generally within construction limits shown on Plan and Profile sheets.
 7. Surface Waters (including wetlands) - Project Location Map and Plan and Profile sheets.
- E. The base site map is amended by contract modifications and progress payments (fieldbook entries) of completed erosion control work. Also, due to project phasing, erosion and sediment controls shown on project plans may not be installed until needed, based on site conditions. For example, silt fence ditch checks will typically not be installed until the ditch has been installed. Fieldbook entries may also be modified from tabulation locations by field staff. Installed locations will be documented by fieldbook entries.
- F. Runoff from this work will flow into "List Outlets For Runoff".

III. CONTROLS

- A. The contractor's ECIP specified in Article 2602.03 for accomplishment of storm water controls should clearly describe the intended sequence of major activities and for each activity define the control measure and the timing during the construction process that the measure will be implemented.
- B. Preserve vegetation in areas not needed for construction.
- C. Sections 2601 and 2602 of the Standard Specifications define requirements to implement erosion and sediment control measures. Actual quantities used and installed locations may vary from the Base PPP and amendment of the plan will be documented via fieldbook entries or by contract modification. Additional erosion and sediment control items may be required as determined by the Inspector and/or contractor according to Article 1109.05 Inspections. If the work involved is not applicable to any contract item, the work will be noted according to Article 1109.05 Paragraph B.
1. EROSION AND SEDIMENT CONTROLS
 - a. Stabilization Practices
 1. Site plans will ensure that existing vegetation or natural buffers are preserved where attainable and disturbed portions of the site will be stabilized.
 2. Stabilization practices shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased.
 3. Temporary stabilizing seeding shall be completed as the disturbed areas are constructed. If construction activity is not planned to occur in a disturbed area for at least 21 days, the area shall be stabilized by temporary seeding or mulching within 14 days.
 4. Permanent and Temporary Stabilization practices to be used for this project are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan.

Typical drawings detailing construction of the practices to be used on this project are referenced in the Standard Road

POLLUTION PREVENTION PLAN

Plans Tabulation.

- 5) Preservation of existing Vegetation within right-of-way or easements will act as vegetative buffer strips.
- 6) Preservation of topsoil: Bid items to be used for this project are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan. Additional information may be found in Tabulations in the C or T sheets of the plans or is referenced in Standard Specifications Section 2105.

- b. Structural Practices
 - 1) Structural Practices will be implemented to divert flows from exposed soils and detain or otherwise limit runoff and the resulting pollutants from erosion of the site. Additional practices include:
 - a) Provide 5000 cubic feet of storage per acre drained or equivalent sediment controls structures that withdraw water from surface when discharging basins, and controls to direct storm water to vegetated areas.
 - b) Structural practices to be used for this project are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan, as well as all other item specific Tabulations. Typical drawings detailing construction of the devices to be used on this project can be found on the B sheets of the plans or are referenced in the Standard Road Plans Tabulation.
 - c. Storm Water Management
 - 1) Measures shall be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. This may include velocity dissipation devices at discharge locations and along length of outfall channel as necessary to provide a non-erosion velocity flow from structure to water course. If included with this project, these items are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan, as well as all other item specific Tabulations and drawings on the B sheets of the plans or are referenced in the Standard Road Plans Tabulation. The installation of these devices may be subject to Section 404 of the Clean Water Act.

2. OTHER CONTROLS

- a. Contractor disposal of unused construction materials and construction material wastes shall comply with applicable state and local waste disposal, sanitary sewer, or septic system regulations. In the event of a conflict with other governmental laws, rules and regulations, the more restrictive laws, rules or regulations shall apply.
 - 1) Vehicle Entrances and Exits - Construct and maintain entrances and exits to prevent tracking of sediments onto roadways.
 - 2) Material Delivery, Storage and Use - Implement practices to prevent discharge of construction materials during delivery, storage, and use.
 - 3) Stockpile Management - Install controls to reduce or eliminate pollution of storm water from stockpiles of soil and paving.
 - 4) Waste Disposal - Do not discharge any materials, including building materials, into waters of the state, except as provided in Section 404 of the Clean Water Act.
 - 5) Spill Prevention and Control - Implement procedures to contain and clean-up spills and prevent material discharges to the storm drain system and waters of the state.
 - 6) Concrete Residuals and Washout Wastes - Designate temporary concrete washout facilities for rinsing out concrete trucks. Provide directions to truck drivers where designated washout facilities are located. Designated washout areas should be located at least 50 feet away from storm drains, streams or other water bodies. Care should be taken to ensure these facilities do not overflow during storm events.
 - 7) Concrete Grooving/Grinding Slurry - Do not discharge slurry to a waterbody or storm drain. Slurry may be applied on foreslopes or removed from the project.
 - 8) Vehicle and Equipment Storage and Maintenance Areas - Perform on site fueling and maintenance in accordance with all environmental laws such as proper storage of outside fuels and proper disposal of used engine oil or other fluids on site. Employ washing practices that prevent contamination of surface and ground water from wash water.
 - 9) Better management - Ensure employees properly dispose of litter and sediment before it re-enters a waterbody or discharges off-site.
 - 10) Measures are also to be taken to prevent scour erosion at dewatering discharge point.

3. APPROVED STATE OR LOCAL PLANS

During the course of this construction, it is possible that situations will arise where unknown materials will be encountered. When such situations are encountered, they will be handled according to all Federal, state, and local regulations in effect at the time.

IV. MAINTENANCE PROCEDURES

The contractor is required to maintain all temporary erosion and sediment control measures in proper working order, including cleaning, repairing, or replacing them throughout the contract period. This shall begin when the features have lost 50% of their capacity.

V. INSPECTION REQUIREMENTS

- A. The contractor shall be made jointly by the contractor and the contracting authority at least once every seven calendar days. Storm water monitoring inspections will include:
 1. Date of the inspection.
 2. Summary of the scope of the inspection.
 3. Name and qualifications of the personnel making the inspection.
 5. Review erosion and sediment control measures within disturbed areas for the effectiveness in preventing impacts to receiving waters.
 6. Major observations related to the implementation of the PPP.
 7. Identify corrective actions required to maintain or modify erosion and sediment control measures.
- B. Identify storm water monitoring inspection reports in the Amended PPP. Incorporate any additional erosion and sediment control measures determined as a result of the inspection. Immediately begin corrective actions on all deficiencies found within 3 calendar days of the inspection.

VI. NON-STORM WATER DISCHARGES

This includes subsurface drains (i.e. longitudinal and standard subdrains) and slope drains. The velocity of the discharge from these features may be controlled by the use of patio blocks, Class A stone, erosion stone or other appropriate materials. This also includes uncontaminated groundwater from dewatering operations, which will be controlled as discussed in Section III of the PPP.

VII. POTENTIAL SOURCES OF OFF RIGHT-OF-WAY (ROW) POLLUTION

Silts, sediment, and other forms of pollution may be transported onto highway right-of-way (ROW) as a result of a storm event. Potential sources of pollution located outside highway ROW are beyond the control of this PPP. Pollution within highway ROW will be conveyed and controlled per this PPP.

VIII. DEFINITIONS

- A. Base PPP - Initial Pollution Prevention Plan.
- B. Amended PPP - May include Plan Revisions or Contract Modifications for new items, storm water monitoring inspection reports, and

POLLUTION PREVENTION PLAN

fieldbook entries made by the inspector.
C. IDR - Inspector's Daily Report - this contains the inspector's daily diary and bid item postings.
D. Controls - Methods, practices, or measures to minimize or prevent erosion, control sedimentation, control storm water, or minimize contaminants from other types of waste or materials. Also called Best Management Practices (BMPs).
E. Signature Authority - Representative from Designer, Contractor/Subcontractor, or RCE/Inspector authorized to sign various storm water documents.

CERTIFICATION STATEMENT
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Printed or Typed Name

Signature

Printed or Typed Name

Pollution Prevention Plan

PPP Item	PPP Reference	Other document referenced in PPP	Permit Reference
Description of the nature of construction	II, A		IV, D, 1, A
Estimate of total area of the site and area of the site expected to be disturbed	II, B		IV, D, 1, B
Estimate of runoff coefficient after construction activities are completed and existing data describing the soil or quality of any discharge from the site	II, C		IV, D, 1, C
Site map:	II, D		IV, D, 1, D
Drainage patterns and approx. slopes after major grading	II, D, 1 & 2	Plan and profile sheets and situation plans	IV, D, 1, D
Areas of soil disturbance	II, D, 3	Plan and profile sheets	IV, D, 1, D
Location of structural and nonstructural controls	II, D, 4 & 5	Tabulations on C sheets	IV, D, 1, D
Location of stabilization practices	II, D, 6	Plan and profile sheets	IV, D, 1, D
Surface waters (including wetlands)	II, D, 7	Project location map and plan and profile sheets	IV, D, 1, D
Locations where storm water is discharged to a surface water	II, D, 8	Plan and profile sheets	IV, D, 1, D
Name of receiving water(s) and ultimate receiving water(s)	II, F		IV, D, 1, E
Sequence of major activities and appropriate control measures and timing during construction when measures will be implemented	III, A	Contractor's ECIP	IV, D, 2
Site plan should ensure existing vegetation is preserved where attainable	III, B and III, C, 1, a, 1)		IV, D, 2, A (1)
Description of temporary and permanent stabilization practices	III, C, 1, a	Estimated project quantities, ERI notes on C sheets, Tabulations, SRP	IV, D, 2, A (1)

PPP Item	PPP Reference	Other document referenced in PPP	Permit Reference
21-14 day rule for stabilization	III, C, 1, a, 3)		IV, D, 2, A (1)
Description of structural practices	III, C, 1, b	Estimated project quantities, ERI notes on C sheets, Tabulations, and SRP	IV, D, 2, A (2)
Sediment basins providing 3600 cubic feet of storage per acre drained or equivalent sediment controls	III, C, 1, b	Estimated project quantities, ERI notes on C sheets, Tabulations, and SRP	IV, D, 2, A (2) (a) & (b)
Unless infeasible:			
Utilize outlet structures that withdraw water from surface when discharging basins	III, C, 1, b	Estimated project quantities, ERI notes on C sheets, Tabulations, and SRP	IV, D, 2, A (2) (c)
Provide and maintain natural buffers around surface waters	III, B and III, C, 1, a, 1)		IV, D, 2, A (2) (c)
Direct storm water to vegetated areas	III, C, 1, b	Estimated project quantities, ERI notes on C sheets, Tabulations, and SRP	IV, D, 2, A (2) (c)
Minimize soil compaction	Future		IV, D, 2, A (2) (c)
Preservation of topsoil - Minimum of 4 inches for areas not covered by concrete, asphalt, or gravel	III, 1, a, 6)	Estimated project quantities, ERI notes on C sheets, Tabulations in C or T sheets, Spec. Section 2105	IV, D, 2, A (2) (c)
Storm Water Management:	III, C, 1, c, 1)		IV, D, 2, B

PPP Item	PPP Reference	Other document referenced in PPP	Permit Reference
Description of measures to control pollutants in post-construction	III, C, 1, c, 1)	Estimated project quantities, ERI notes on C sheets, Tabulations, and SRP	IV, D, 2, B (1)
Goal of 80% removal of total suspended solids from flows which exceed predevelopment levels. When goal not met, justification should be provided for rejecting practices based on site conditions	Future		IV, D, 2, B (1)
Velocity dissipation devices at discharge locations and along length of outfall channel as necessary to provide a non-erosive velocity flow from structure to water course	III, C, 1, c, 1)	Estimated project quantities, ERI notes on C sheets, Tabulations, and SRP	IV, D, 2, B (2)
All wastes composed of building materials must be removed from the site. No building material wastes or unused building materials shall be buried, dumped, or discharged	III, C, 2, a & III, C, 2, a, 4)		IV, D, 2, C (1)
Off-site vehicle tracking shall be minimized	III, C, 2, a, 1)		IV, D, 2, C (2)
Ensure and demonstrate compliance with applicable State or local waste disposal, sanitary sewer or septic regulations	III, C, 2		IV, D, 2, C (3)
Procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by state or local officials	III, C, 3		IV, D, 2, D
Maintenance - Description of procedures to maintain vegetation and erosion and sediment control measures	IV		IV, D, 3
Inspections:	V		IV, D, 4
Qualified personnel shall inspect disturbed areas that have not been stabilized with perennial, vegetative cover of sufficient density to preclude erosion at least once every seven calendar days	V, A		IV, D, 4
Based on inspection, implementation of modifications within 7 calendar days following inspection	V, B		IV, D, 4, B

PPP Item	PPP Reference	Other document referenced in PPP	Permit Reference
Inspection report including scope of inspection, names and qualifications of the inspection personnel, date of inspection, major observations, and actions taken	V, A, 1 to 7		IV, D, 4, C
Non-storm water discharges must be identified in the plan	VI		IV, D, 5
Contractors and subcontractors must sign a certification statement	I, B, 1	Co-permittee certification forms	IV, D, 7
PPP Certification statement	Certification paragraph and signature(s)		IV, B, 1

Iowa DNR NPDES General Permit #2

Copy of Permit: Effective 10/1/12 to 10/1/17

Sample Authorization

Note: Comments, underlining, and highlighting have been added to emphasize sections of the permit.

IOWA DEPARTMENT OF NATURAL RESOURCES

**NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM (NPDES)**

GENERAL PERMIT NO. 2

EFFECTIVE DATES

OCTOBER 1, 2012 THROUGH OCTOBER 1, 2017

FOR

←
5 year permit

STORM WATER DISCHARGE ASSOCIATED WITH
CONSTRUCTION ACTIVITIES

NPDES GENERAL PERMIT NO. 2
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PART I. COVERAGE UNDER THIS PERMIT

A. **PERMIT AREA** This permit covers all areas of the State of Iowa.

Construction sites disturbing 1 acre or more are covered under this permit.

B. **ELIGIBILITY**

1. A. Except for discharges identified under Parts I.B.2. and I.B.3., this permit may authorize the discharge of storm water associated with industrial activity from construction sites, (those sites or common plans of development or sale that will result in the disturbance of one or more acres total land area), (hereafter referred to as storm water discharge associated with industrial activity for construction activities) occurring after the effective date of this permit (including discharges occurring after the effective date of this permit where the construction activity was initiated before the effective date of this permit), including storm water discharge associated with industrial activity from areas that are dedicated to producing earthen materials, such as soils, sand and gravel, for use at a single construction site.

B. This permit may authorize storm water discharge from a construction site that is mixed with storm water discharge associated with industrial activity from sources other than construction activities provided that the storm water discharge from the industrial (non-construction) source is in compliance with the terms of a NPDES general permit, other than this general permit, or individual permit authorizing such discharge. In addition, the storm water other than from construction, shall be in compliance with Part IV.D.6. of this permit.

2. **LIMITATIONS ON COVERAGE** The following storm water discharges associated with industrial activity for construction activities are **not** authorized by this permit:

A. storm water discharges that are mixed with sources of non-storm water other than discharges identified in Part III.A.2. of this permit;

B. storm water discharges associated with industrial activity for construction activities which are covered by an existing individual NPDES permit or which are issued a permit in accordance with Part I.C. of this permit.

Storm water discharges authorized by an existing individual NPDES permit will be eligible to apply for coverage under this general permit as the existing individual permit expires; and

C. storm water discharges associated with industrial activity for construction activities that the Iowa Department of Natural Resources has determined to be or may reasonably be expected to be contribute to a violation of a water quality standard.

This requires an individual permit.

D. new or expanded “storm water discharge associated with industrial activity” that discharges to Outstanding Iowa Waters or to Outstanding National Resource Waters.

3. **EXCLUSIONS** The following “storm water discharges associated with industrial activity” from construction activities do not require an NPDES permit:

These activities do not require a permit.

discharges from agricultural and silvicultural activities including storm water runoff from orchards, cultivated crops, pastures, range lands, and forest lands, but not discharges from concentrated animal feeding operations as defined in 40 CFR 122.23, concentrated aquatic production facilities as defined in 40 CFR 122.24, discharges to aquaculture projects as defined in 40 CFR 122.25, and discharges from silvicultural point sources as defined in 40 CFR 122.27.

C. **REQUIRING AN INDIVIDUAL PERMIT**

1. The Department may require any person authorized by this permit to apply for and obtain an individual NPDES permit. The Department may require any owner or operator authorized to discharge under this permit to apply for an individual NPDES permit only if the owner or operator has been notified in writing that a permit application is required. This notice shall include a brief

NOI is handled by designer and Office of Construction before construction.

II. NOTICE OF INTENT (NOI) REQUIREMENTS

statement of the reasons application form, a statement setting a deadline for the owner or operator to file the application, and a statement that on the effective date of the individual NPDES permit, coverage under this general permit shall automatically terminate. If an owner or operator fails to submit an individual NPDES permit application required by the Department under this paragraph, coverage of this general permit automatically is terminated at the end of the day specified for submittal of the individual NPDES application.

2. Any person authorized to discharge under this permit may apply for an individual NPDES permit. In such cases, the discharger shall submit the following in accordance with the requirements of subrule (567)--64.3(4) in the Iowa Administrative Code:

A. an individual application, using DNR Form 1 and EPA Form 2F, and,

B. all applicable fees identified in rule (567)--64.16 in the Iowa Administrative Code.

3. When an individual NPDES permit is issued to a discharger covered under this general permit, the applicability of this general permit to the individual NPDES permittee is automatically terminated on the effective date of the individual NPDES permit.

When an individual NPDES permit is denied to a discharger otherwise subject to this permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the date of such denial, unless otherwise specified by the Department.

D. AUTHORIZATION

A discharger must submit a Notice of Intent (NOI) in accordance with the requirements of Part II of this permit in order for storm water discharge associated with industrial activity for construction activities pursuant to Part I.B. of this permit to be authorized to discharge under this general permit.

A. DEADLINES FOR FILING A NOTICE OF INTENT

For storm water discharge associated with industrial activity for construction activities where construction begins after October 1, 1992, construction activities shall not commence until an authorization has been issued for the project by the Department.

- B. FAILURE TO NOTIFY** Dischargers who fail to notify the Department of their intent to be covered, and discharge pollutants to water of the United States within Iowa, without an NPDES permit, are in violation of the Clean Water Act and the Code of Iowa.

- C. CONTENTS OF THE NOTICE OF INTENT** A complete Notice of Intent shall include the items described in Parts II.C.1., II.C.2., and II.C.3. of this permit.

1. A completed Notice of Intent (NOI) form, DNR Form 542-1415, signed in accordance with Part VI.G. of this permit. The information on the form shall include the following:

A. Name, address, and location of the construction site for which this notification is submitted. The location should be provided as the 1/4 section, township, range, and the county in which the storm water discharge is located.

B. The owner's name, address, telephone number, and status (federal, state, private, public or other entity).

C. The name, address and telephone number of any operator (contractor) that has been identified as having a role in the storm water pollution prevention plan for the site required under Part IV.D.7. of this permit. Contractors (operators) identified after the submittal of the completed Notice of Intent shall be identified in the pollution prevention plan.

IOWA DEPARTMENT OF NATURAL RESOURCES NPDES GENERAL PERMIT NO. 2
STORM WATER DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY FOR CONSTRUCTION ACTIVITIES
EFFECTIVE DATE - OCTOBER 1, 2012 TO OCTOBER 1, 2017

D. The type of discharge (new or existing as related to October 1, 1992); whether or not the discharge is to a municipal separate storm sewer system; the date the discharge is to commence; the permit status of the discharge; and, the name of the receiving waters.

E. An indication if any existing quantitative data is available describing the concentration of pollutants in storm water discharges and a summary of available existing data. (Existing data should not be included as part of the NOI, it should retained as part of the Pollution Prevention Plan).

F. A brief description of the project; an estimated timetable for major activities; and, an estimate of the number of acres of the site on which soil will be disturbed.

G. A certification that compliance with **G.(1).** through **G.(4).** are met:

G.(1). the pollution prevention plan has been developed before this Notice of Intent is submitted to the Department;

G.(2). the pollution prevention plan will be implemented on October 1, 1992 for any existing storm water discharge associated with industrial activity for construction activities. For a storm water discharge associated with industrial activity for construction activities that commence after October 1, 1992, the pollution prevention plan shall be implemented with the start of construction activities;

G.(3). this Notice of Intent will be included and incorporated into the pollution prevention plan and will be updated as required; and,

G.(4). the storm water pollution prevention plan provides compliance with section 467A.64 of the Code of Iowa and local sediment and erosion plans and are consistent with the requirements of Part IV of this general permit.

2. **APPLICABLE FEES** The applicable fees specified in Iowa Administrative Code 567 -- 64.16(455B).

3. **PUBLIC NOTIFICATION** A demonstration that the public notice specified in Iowa Administrative Code 567--64.6(1)"c"(2) was published at least one day, in one newspaper with the largest circulation in the area in which the facility is located or the activity will occur.

D. **WHERE TO SUBMIT** Facilities which discharge storm water associated with industrial activity for construction activities must submit items described in Parts II.C.1., 2., and 3. of this permit to the Department at the following address:

Storm Water Coordinator
Iowa Department of Natural Resources
502 E. 9th St.
Des Moines, IA 50319-0034

E. **RENOTIFICATION** Prior to the expiration of an authorization issued under this general permit, the permittee is required to resubmit a Notice of Intent (no additional public notice is required) with the Department for coverage under the new general permit. If a new general permit has not been reissued prior to the expiration of the current permit, the provisions and coverage of the current permit are extended until replaced by the adoption of a new general permit.

F. **TRANSFER OF COVERAGE UNDER THIS PERMIT** For storm water discharge associated with industrial activity for construction activities where the ownership changes, the Department must be notified of the title transfer within 30 days. Both the previous owner(s) and the new owner(s) are responsible for notifying the Department of the transfer and the new owner's name and contact information. This requirement shall be satisfied upon the Department's receipt of the notification of this information by either the previous owner(s) or the new owner(s). If a storm water discharge associated with industrial activity for construction activities is covered by this general permit, the new owner(s) shall be subject to all terms and

conditions of this general permit. A copy of the notice of transfer that was sent to the Department shall be included in the pollution prevention plan. For construction activity which is part of a larger common plan of development such as a housing or commercial development project, if a permittee transfers ownership of all or any part of property subject to this permit, both the permittee and transferee shall be responsible for compliance with the provisions of this permit for that portion of the project which has been transferred including when the transferred property is less than one acre in area. If the new owner(s) agree in writing to be solely responsible for compliance with the provisions of this permit for the property which has been transferred, then the existing permittee(s) shall be relieved of responsibility for compliance with this permit for the transferred property from and after the date the transferee receives written notice of the transfer of responsibility. A copy of the notice of responsibility shall be included in the pollution prevention plan.

RCE sends to Office of Construction after final stabilization.

G. NOTICE OF DISCONTINUATION

1. Within 30 days after **final stabilization** at a construction site (as defined in Part VIII of this permit), the operator or owner of the facility shall submit a Notice of Discontinuation to the Department.
2. The Notice of Discontinuation shall include the following information:
 - A. the name of the owner/operator to which the permit was issued;
 - B. the general permit number and permit authorization number;
 - C. the date the construction site reached final stabilization; and,
 - D. the following certification signed in accordance with Part VI.G. of this permit:

Definition is on p. 13 of permit

"I certify under penalty of law that disturbed soils at the identified facility have been finally stabilized and temporary erosion and sediment control measures have been removed or will

be removed at an appropriate time. I understand that by submitting this Notice of Discontinuation, that I am no longer authorized to discharge storm water associated with industrial activity for construction activities by Iowa Department of Natural Resources General NPDES Permit No. 2. and that discharging pollutants from storm water associated with industrial activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit."

PART III. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, AND OTHER NON-NUMERIC LIMITATIONS

A. PROHIBITION ON NON-STORM WATER DISCHARGES

1. All discharges authorized by this permit shall be composed entirely of storm water except for non-storm discharges listed in Part III.A.2.
2. Discharges from fire fighting activities; fire hydrant flushings; waters used to wash vehicles in accordance with Part IV.D.2.C.(2); potable water sources including waterline flushings; irrigation drainage; routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; springs; **uncontaminated groundwater**; and foundation or footing drains where flows are not contaminated with process materials such as solvents; may be authorized by this permit provided the non-storm water component of the discharge is in compliance with Part IV.D.5. of this permit.

B. RELEASES IN EXCESS OF REPORTABLE QUANTITIES

Any owner or operator identified in the pollution prevention plan is subject to the spill notification requirements as specified in 455B.386 of the Iowa Code. Iowa law requires that as soon as possible but not more than six hours after the onset of a "hazardous condition" the Department and local

See "Retention of Records" p. 10.

sheriff's office or the office of the sheriff of the affected county be notified.

The storm water pollution prevention plan described in Part IV of this permit must be modified within 5 calendar days of knowledge of the release to provide a description of the release and the circumstances leading to the release and to identify and provide for the implementation of steps to prevent the reoccurrence of such releases and to respond to such releases.

PART IV. STORM WATER POLLUTION PREVENTION PLANS

A storm water pollution prevention plan shall be developed for each construction site covered by this permit. Storm water pollution prevention plans shall be prepared in accordance with good engineering practices. The plan shall identify potential sources of pollution which may reasonably be expected to affect the quality of the storm water discharge from the construction activities. In addition, the plan shall describe and ensure the implementation of practices which will be used to reduce the pollutants in storm water discharge associated with industrial activity for construction activities at the construction site and to assure compliance with the terms and conditions of this permit. Facilities must implement the provisions of the storm water pollution prevention plan required under this part as a condition of this permit.

A. DEADLINES FOR POLLUTION PREVENTION PLAN PREPARATION AND COMPLIANCE

- 1. POLLUTION PREVENTION PLAN PREPARATION DEADLINE** The pollution prevention plan shall be completed prior to the submittal of an NOI to the Department to be covered under this permit and shall be updated as appropriate.
- 2. POLLUTION PREVENTION PLAN COMPLIANCE DEADLINE** The pollution prevention plan shall provide for compliance with the terms and schedule of the plan prior to the initiation of construction activities.

B. SIGNATURE AND PLAN REVIEW

- 1.** The plan shall be signed in accordance with Part VI.G., and be retained at the construction site from the date construction activities begin to the date of final stabilization.
 - 2.** The permittee shall make plans available to the Department upon request, or in the case of a storm water discharge associated with industrial activity for construction activities which discharge through a municipal separate storm sewer system with an NPDES permit, to the municipal operator of the system. MS4
 - 3.** The Department may notify the permittee at any time that the plan does not meet one or more of the minimum requirements of this Part. After such notification from the Department, the permittee shall make changes to the plan and shall submit to the Department a written certification that the requested changes have been made. Unless otherwise provided by the Department, the permittee shall have 3 business days after such notification to make the necessary changes.
 - 4.** All storm water pollution prevention plans received by the Department from the permittee are considered reports that shall be available to the public under Section 308(b) of the CWA and Chapter 22 of the Code of Iowa. However, the permittee may claim any portion of a storm water pollution plan as confidential in accordance with Chapter 22 of the Code of Iowa and Iowa Administrative Code (561)--2.5.
- ##### **C. KEEPING PLANS CURRENT**
- The permittee shall amend the plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not been addressed in the plan or if the storm water pollution prevention plan proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified in Part IV.D.2. of this permit, or in otherwise achieving the general objectives of controlling pollutants in storm water discharge associated with industrial activity for construction

activities. In addition, the pollution prevention plan shall be updated to: expeditiously change the site map to include changes at the site, include contractors identified after the submittal of the Notice of Intent as Co-permittees, described in Part IV.D.7. of this permit; identify any change in ownership or transference of the permit and permit responsibilities; or, if required, by the occurrence of a hazardous condition (as defined in Part VIII of this permit). Amendments to the plan may be reviewed by the Department of Natural Resources in the same manner as Part IV.B.2.

D. CONTENTS OF THE POLLUTION PREVENTION PLAN. The storm water pollution prevention plan shall include the following items:

1. SITE DESCRIPTION Each plan shall provide a description of the following:

- A. a description of the nature of the construction activity;
- B. estimates of the total area of the site and the area of the site that is expected to be disturbed by excavation, grading, or other activities;
- C. an estimate of the runoff coefficient of the site after construction activities are completed and existing data describing the soil or the quality of any discharge from the site;
- D. a site map indicating drainage patterns and approximate slopes anticipated after major grading activities, areas of soil disturbance, the location of structural and nonstructural controls identified in the plan, the location of areas where stabilization practices are expected to occur, surface waters (including wetlands), and locations where storm water is discharged to a surface water; and
- E. the name of the receiving water(s) and the ultimate receiving water(s).

2. CONTROLS Each plan shall include a description of controls that will be implemented at the construction site. The plan will clearly describe the intended sequence of

major activities and for each activity, the appropriate control measures and the timing during the construction process that the measures will be implemented. (For example, perimeter controls for one portion of the site will be installed after the clearing and grubbing necessary for installation of the measure, but before the clearing and grubbing for the remaining portions of the site. Perimeter controls will be actively maintained until final stabilization of those portions of the site upward of the perimeter control. Temporary perimeter controls will be removed after final stabilization). The description of controls shall address the following minimum components:

A. EROSION AND SEDIMENT CONTROLS

A.(1). STABILIZATION PRACTICES A description of temporary and permanent stabilization practices, including site-specific scheduling of the implementation of the practices. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed areas are stabilized. Stabilization practices may include: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. **Except as precluded by snow cover, stabilization measures shall be initiated on all disturbed areas as soon as practical but in no case where construction activity will not occur for a period of 21 or more calendar days later than the 14th day after no construction activity has occurred on such area.** Where the initiation of stabilization measures by the 14th day after no construction activity occurs is precluded by snow cover, then stabilization measures shall be initiated as soon as practicable thereafter.

A.(2). STRUCTURAL PRACTICES A description of structural practices to the degree attainable, to divert flows from exposed soils, store flows or otherwise limit runoff from exposed areas of the site. Such practices may include silt fences, earth dikes, brush barriers, drainage swales, sediment

Section II of PPP

14-21 day rule

Section III of PPP

Storage capacity requirements

traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. Structural practices should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA.

A.(2).(a). For common drainage locations that serve an area with more than 10 disturbed acres at one time, a temporary or permanent sediment basin providing 3,600 cubic feet of storage per acre drained shall be provided where attainable until final stabilization of the site has been achieved. The 3,600 cubic feet of storage area per acre drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around the sediment basin. For drainage locations which serve more than 10 disturbed acres at one time and where a temporary sediment basin providing 3,600 cubic feet of storage per acre drained is not attainable, sediment traps, silt fences, or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area.

A.(2).(b). For drainage locations serving 10 or fewer acres, sediment traps, silt fences or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area or a sediment basin providing for 3,600 cubic feet of storage per acre drained.

A.(2).(c). Unless infeasible, the following measures shall be implemented at all sites: utilize outlet structures that withdraw water from the surface when discharging from basins, provide and maintain natural buffers around surface waters and direct storm water to vegetated areas to both increase sediment removal and maximize storm water infiltration.

The permittee(s) shall minimize soil compaction and, unless infeasible, preserve topsoil. "Infeasible" shall mean not

technologically possible, or not economically practicable and achievable in light of the best industry practices. "Unless infeasible, preserve topsoil" shall mean that, unless infeasible, topsoil from any areas of the site where the surface of the ground for the permitted construction activities is disturbed shall remain within the area covered by the applicable General Permit No. 2 authorization. Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted. Preserving topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed. The permittee(s) shall control storm water volume and velocity to minimize soil erosion in order to minimize pollutant discharges and shall control storm water discharges, including both peak flowrates and total storm water volume, to minimize channel and stream bank erosion and scour in the immediate vicinity of discharge points. An affidavit signed by the permittee(s) may be submitted to demonstrate compliance.

For construction activity which is part of a larger common plan of development, such as a housing or commercial development project, in which a new owner agrees in writing to be solely responsible for compliance with the provisions of this permit for the property which has been transferred or in which the new owner has obtained authorization under this permit for a lot or lots (as specified in subrule 567-64.6(6) of the Iowa Administrative Code), the topsoil preservation requirements described above must be met no later than at the time the lot or lots have reached final stabilization as described in this permit.

The topsoil preservation requirement described above shall be implemented for projects that have not received an authorization under this permit prior to October 1, 2012. The topsoil preservation requirements are not required to be implemented for projects that have been authorized prior to October 1, 2012. In residential and commercial developments, a plat is considered a project. For other large areas that have been authorized for multiple

Topsoil preservation requirement - revised 8/2015. This replaced "4-inch rule".

construction sites, including those to be started at a future date, such as those located at industrial facilities, military installations and universities, a new construction project not yet surveyed and platted out is considered a project. This stipulation is intended to be interpreted as requiring the topsoil preservation requirements on development plats and construction activities on other extended areas that may have several construction projects permitted under the same authorization to be implemented on those projects not yet surveyed and platted out prior to October 1, 2012 even if other plats and construction activities in the same development or other extended area were authorized prior to October 1, 2012.

B. STORM WATER MANAGEMENT A description of measures that will be installed during construction to control pollutants in storm water discharges that will occur after construction operations have been completed. The installation of these devices may be subject to Section 404 of the CWA. This permit only addresses the installation of storm water management measures, and not the ultimate operation and maintenance of such structures after the construction activities have been completed and the site has undergone final stabilization. Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site, and are not responsible for maintenance after storm water discharges associated with industrial activity have been eliminated from the site.

B.(1). Such practices may include: storm water detention structures (including wet ponds); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; and infiltration of runoff onsite; and sequential systems (which combine several practices). A goal of 80 percent removal of total suspended solids from those flows which exceed predevelopment levels should be used in designing and installing storm water management controls (where practicable). Where this goal is not met, the permittee shall provide justification

for rejecting each practice based on site conditions.

B.(2). Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g. maintenance of hydrologic conditions present prior to the initiation of construction activities).

C. OTHER CONTROLS

Off-site tracking

C.(1). WASTE DISPOSAL All wastes composed of building materials must be removed from the site for disposal in permitted disposal facilities. No building material wastes or unused building materials shall be buried, dumped, or discharged at the site.

C.(2). Off-site vehicle tracking of sediments shall be minimized.

C.(3). The plan shall ensure and demonstrate compliance with applicable State or local waste disposal, sanitary sewer or septic system regulations.

D. APPROVED STATE OR LOCAL PLANS

Facilities which discharge storm water associated with industrial activity for construction activities must include in their storm water pollution prevention plan procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by State or local officials. Applicable requirements specified in sediment and erosion plans, site permits or storm water management plans approved by State or local officials that are applicable to protecting surface water resources are, upon submittal of an NOI to be authorized to discharge under this permit, incorporated by reference and are enforceable under this permit even if they are not specifically included in a storm water pollution prevention plan required under this permit.

Operators of facilities seeking alternative permit requirements shall submit an individual permit application in accordance with Part I.C.2. of this permit along with a description of why requirements in approved State or local plans should not be applicable as a condition of an NPDES permit.

3. **MAINTENANCE** A description of procedures to maintain in good and effective operating conditions vegetation, erosion and sediment control measures and other protective measures identified in the site plan.

Site inspections

4. **INSPECTIONS** **Qualified personnel** (provided by the discharger) shall **inspect disturbed areas of the construction site that have not been stabilized with a perennial, vegetative cover of sufficient density to preclude erosion at least once every seven calendar days. Unless erosion is evident or other conditions warrant them, regular inspections are not required on areas that have been stabilized with a perennial, vegetative cover of sufficient density to preclude erosion.**

A. **Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the plan shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of offsite sediment tracking.**

B. Based on the results of the inspection, the description of potential pollutant sources identified in the plan in accordance with paragraph IV.D.1. of this permit and pollution prevention measures identified in the plan in accordance with paragraph IV.D.2. of this permit **shall be revised as appropriate as soon as practicable after such inspection. Such modifications shall provide for implementation of any changes to the plan**

within 7 calendar days following the inspection.

PPP requires 3 days

C. A **report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the storm water pollution prevention plan, and actions taken** in accordance with paragraph IV.D.4.B. of the permit shall be made and retained as part of the storm water pollution prevention plan for at least three years after final stabilization has been achieved and a Notice of Discontinuation has been submitted to the Department. The report shall be signed in accordance with Part VI.G. of this permit.

Inspection report requirements

5. **NON-STORM WATER DISCHARGES** Except for flows from fire fighting activities, sources of non-storm water listed in Part III.A.2. of this permit that are combined with storm water discharges associated with industrial activity from construction activities must be identified in the plan. The plan shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

What to inspect.

6. **ADDITIONAL REQUIREMENTS FOR STORM WATER DISCHARGE FROM INDUSTRIAL ACTIVITIES OTHER THAN CONSTRUCTION, INCLUDING DEDICATED ASPHALT PLANTS, AND DEDICATED CEMENT PLANTS** This permit may only authorize a storm water discharge associated with industrial activity from a construction site that is mixed with a storm water discharge from an industrial source other than construction, where:

A. the industrial source other than construction is located on the same site as the construction activity;

B. storm water discharges associated with industrial activity from the areas of the site where construction activities are occurring are in compliance with the terms of this permit; and,

C. storm water discharges associated with industrial activity from the areas of the site

where industrial activity other than construction are occurring (including storm water discharges from dedicated asphalt plants and dedicated cement plants) are in compliance with the terms and conditions, including applicable NOI or application requirements, of a different NPDES general permit or individual permit authorizing such discharges.

required under the Clean Water Act and the Code of Iowa, to ensure compliance with the terms and conditions of the storm water pollution prevention plan developed under this NPDES permit and the terms of this NPDES permit."

The certification must include the name and title of the person providing the signature; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

7. **CONTRACTORS**

Co-permittees

A. The storm water pollution prevention plan must clearly identify for each measure in the plan, the contractor(s) and/or subcontractor(s) that will implement the measure. All contractors and subcontractors identified in the plan must sign a copy of the certification statement in Part IV.D.7.B. of this permit in accordance with Part VI.G. of this permit. Upon signing the certification, the contractor or sub-contractor is a co-permittee with the owner and other co-permittee contractors. All certifications must be included in the storm water pollution prevention plan.

PART V. RETENTION OF RECORDS

A. The permittee shall retain copies of storm water pollution prevention plans and all reports required by this permit, and records of all data used to complete the Notice of Intent to be covered by this permit, for a period of at least three years from the date that the site is finally stabilized and a Notice of Discontinuation has been submitted to the Department.

Where records are to be kept

B. **CERTIFICATION STATEMENT** All contractors and subcontractors identified in a storm water pollution prevention plan in accordance with Part IV.D.7.A. of this permit shall sign a copy of the following certification statement before conducting any professional service at the site identified in the storm water pollution prevention plan:

B. If there is a construction trailer, shed or other covered structure located on the property the permittee shall retain a copy of the storm water pollution prevention plan required by this permit at the construction site from the date of project initiation to the date of final stabilization. If there is no construction trailer, shed or other covered structure located on the property, the permittee shall retain a copy of the plan at a readily available alternative site approved by the Department and provide it for inspection upon request. If the plan is maintained at an off-site location such as a corporate office, it shall be provided for inspection no later than three hours after being requested.

"I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site as part of this certification. Further, by my signature, I understand that I am becoming a co-permittee, along with the owner(s) and other contractors and subcontractors signing such certifications, to the Iowa Department of Natural Resources NPDES General Permit No. 2 for "Storm Water Discharge Associated with Industrial Activity for Construction Activities" at the identified site. As a co-permittee, I understand that I, and my company, are legally

C. **ADDRESSES** All written correspondence to the Department should be sent to the following address:

Storm Water Coordinator
Iowa Department of Natural Resources
502 E. 9th St.
Des Moines, IA 50319-0034

Language on co-permittee certification statement. Form 830215.

PART VI. STANDARD PERMIT CONDITIONS

A. DUTY TO COMPLY

1. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Code of Iowa and the Clean Water Act and is grounds for enforcement action; for termination of coverage under this general permit; or, for denial of a request for coverage under a reissued general permit.

2. **TOXIC POLLUTANTS** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act (CWA) for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

B. CONTINUATION OF THE EXPIRED GENERAL PERMIT This permit expires on October 1, 2017. An expired general permit continues in force until replaced by adoption of a new general permit.

C. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. DUTY TO MITIGATE The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. DUTY TO PROVIDE INFORMATION The permittee shall furnish to the Department, within three hours, any information which the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department upon request copies of records required to be kept by this permit.

F. OTHER INFORMATION When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect

information in the Notice of Intent or in any other report to the Department, he or she shall promptly submit such facts or information.

G. SIGNATORY REQUIREMENTS All Notices of Intent, storm water pollution prevention plans, reports, certifications or information either submitted to the Department or the operator of a municipal separate storm sewer system, or that this permit requires be maintained by the permittee, shall be signed in accordance with rule 567--64.3(8) of the Iowa Administrative Code as follows:

64.3(8) *Identity of signatories of operation permit applications.* The person who signs the application for an operation permit shall be:

a. Corporations. In the case of corporations, a principal executive officer of at least the level of vice-president.

b. Partnerships. In the case off a partnership, a general partner.

c. Sole proprietorships. In the case of a sole proprietorship, the proprietor.

d. Public facilities. In the case of a municipal, state, or other public facility, by either the principal executive officer, or the ranking elected official.

e. Storm water discharge associated with industrial activity from construction activity. In the case of a storm water discharge associated with industrial activity from construction as identified in 40 CFR 122.26(b)(14)(x), either the owner of the site or the general contractor.

The person who signs NPDES reports shall be the same, except that in the case of a corporation or a public body, monitoring reports required under the terms of the permit may be submitted by the person who is responsible for the overall operation of the facility from which the discharge originated.

Certification language on PPP and inspection report.

- H. **CERTIFICATION** Any person signing documents under paragraph VI.G. shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

- I. **OIL AND HAZARDOUS SUBSTANCE LIABILITY** Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under section 311 of the Clean Water Act.
- J. **PROPERTY RIGHTS** The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.
- K. **SEVERABILITY** The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.
- L. **TRANSFERS** This permit is not transferable to any person except after notice to the Department. The Department may require the discharger to apply for and obtain an individual NPDES permit as stated in Part I.C.

M. **PROPER OPERATION AND MAINTENANCE**

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions or this permit.

- N. **INSPECTION AND ENTRY** The permittee shall allow the Department or an authorized representative of EPA, the State, or, in the case of a facility which discharges through a municipal separate storm sewer, an authorized representative of the municipal operator or the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and,
3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

- O. **PERMIT ACTIONS** Coverage under this permit may be terminated for cause. The filing of a request by the permittee for a permit discontinuance, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

- P. **ENVIRONMENTAL LAWS** No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

PART VII. REOPENER CLAUSE

If there is evidence indicating potential or realized impacts or water quality due to any storm water discharge associated with industrial activity for construction activities covered by this permit, the owner or operator of such discharge may be required to obtain individual permit in accordance with Part I.C of this permit.

PART VIII. DEFINITIONS

"Best Management Practices" ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Construction site" means a site or common plan of development or sale on which construction activity, including clearing, grading and excavating, results in soil disturbance. A construction site is considered one site if all areas of the site are contiguous with one another and one entity owns all areas of the site.

"CWA" or "Clean Water Act" means the Federal Water Pollution Control Act.

"Dedicated portable asphalt plant" means a portable asphalt plant that is located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to.

"Dedicated portable concrete plant" means a portable concrete plant that is located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

"Dedicated sand or gravel operation" means an operation that produces sand and/or gravel for a single construction project.

"Department" means the Iowa Department of Natural Resources.

"Final Stabilization" means that all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% for the area has been established or equivalent stabilization measures have been employed or which has been returned to agricultural production.

"Hazardous condition" means any situation involving the actual, imminent, or probable spillage, leakage, or release of a hazardous substance on to the land, into a water of the state, or into the atmosphere, which creates an immediate or potential danger to the public health or safety or to the environment. 455B.381(2) 1991, Code of Iowa

"Hazardous substance" means any substance or mixture of substances that presents a danger to the public health or safety and includes, but is not limited to, a substance that is toxic, corrosive, or flammable, or that is an irritant or that, in confinement, generates pressure through decomposition, heat, or other means. The following are examples of substances which, in sufficient quantity may be hazardous: acids; alkalis; explosives; fertilizers; heavy metals such as chromium, arsenic, mercury, lead and cadmium; industrial chemicals; paint thinners; paints; pesticides; petroleum products; poisons, radioactive materials; sludges; and organic solvents. "Hazardous substances" may include any hazardous waste identified or listed by the administrator of the United State Environmental Protection Agency under the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976, or any toxic pollutant listed under section 307 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous substance designated under section 311 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous material designated by the secretary of transportation under the Hazardous Materials Transportation Act (49 CFR 172.101). 455B.381(1), 1991 Code of Iowa

"Municipality" means a city, town, borough, county, parish, district, association, or other public body created by or under State law.

"NOI" means Notice of Intent to be covered by this permit (see Part II of this permit.)

"Outstanding Iowa Waters" means those waters which constitute an outstanding state resource such as waters of exceptional recreational or ecological significance. These waters are identified in Appendix B of the Iowa Antidegradation Implementation Procedure manual.

"Outstanding National Resource Waters" means those waters which constitute an outstanding national resource such as waters of national and state parks and wildlife refuges and also waters of exceptional recreational or ecological significance. These waters are identified in Appendix B of the Iowa Antidegradation Implementation Procedure manual.

"Permittee" means the owner of the facility or site.

"Qualified personnel" means those individuals capable enough and knowledgeable enough to perform the required functions adequately well to ensure compliance with the relevant permit conditions and requirements of the Iowa Administrative Code.

"Runoff coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.

"Storm Water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

"Storm water discharge associated with industrial activity" means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under 40 CFR part 122. For the categories of industries identified in paragraphs (i) through (x) of this definition, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at 40 CFR part 401); sites used for the storage and maintenance of material handling

equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water.

For the categories of industries identified in paragraph (xi) of this definition, the term includes only storm water discharges from all the areas (except access roads and rail lines) that are listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water. For the purposes of this paragraph, material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product, or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in these paragraphs (i)-(xi) of the definition) include those facilities designated under 40 CFR 122.26(a)(1)(v). The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this definition;

(i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N (except facilities with toxic pollutant effluent standards which are exempted under category (xi) of this definition);

(ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3441, 373;

(iii). Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area

IOWA DEPARTMENT OF NATURAL RESOURCES NPDES GENERAL PERMIT NO. 2
STORM WATER DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY FOR CONSTRUCTION ACTIVITIES
EFFECTIVE DATE - OCTOBER 1, 2012 TO OCTOBER 1, 2017

under 40 CFR 434.11(1) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990) and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations; (inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator; inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining a mining claim);

(iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA;

(v) Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under Subtitle D of RCRA;

(vi) facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;

(vii) Steam electric power generating facilities, including coal handling sites;

(viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221-4225), 43, 44, 45 and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport

deicing operations, or which are otherwise identified under paragraphs (i)-(vii) or (ix)-(xi) of this definition are associated with industrial activity;

(ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with 40 CFR 503;

(x) Construction activity including clearing, grading and excavation activities except: operations that result in the disturbance of less than one acre of total land area which are not part of a larger common plan of development or sale;

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-4225, (and which are not otherwise included within categories (ii)-(x));

"Storm water discharge associated with industrial activity for construction activities" means activities that fall under subparagraph (x) in the definition of storm water discharge associated with industrial activity.

"Topsoil" means the fertile, uppermost part of the soil containing significant organic matter largely devoid of debris and rocks and often disturbed in cultivation.

"Uncontaminated groundwater" means water that is potable for humans, meets the narrative water quality standards in subrule 567-61.3(2) of the Iowa Administrative Code, contains no more than half the listed concentration of any pollutants in subrule 567-61.3(3) of the IAC, has a pH of 6.5-9.0 and is located in soil or rock strata.



TERRY E. BRANSTAD, GOVERNOR
KIM REYNOLDS, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
ROGER L. LANDE, DIRECTOR

DEPARTMENT OF NATURAL RESOURCES
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
NOTICE OF GENERAL PERMIT COVERAGE UNDER
GENERAL PERMIT NO. 2

STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITY

This notice of general permit coverage for a storm water discharge associated with construction activity is issued pursuant to the authority of section 402 (b) of the Clean Water Act (U.S.C. 1342(b)), Iowa Code 455B.174, and subrule 567--64.4(2), Iowa Administrative Code. A Notice of Intent has been filed with the Iowa Department of Natural Resources that this storm water discharge complies with the terms and conditions of NPDES General Permit No. 2. Authorization is hereby issued to discharge storm water associated with industrial activity as defined in Part VIII of the Iowa Department of Natural Resources NPDES General Permit No. 2 in accordance with the terms and conditions set forth in the permit.

**Owner: IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF CONSTRUCTION
800 LINCOLN WAY
AMES IA 50010
(515)239-1280**

Permit Coverage Issued To:

**IDOT - I29/80 SEGMENT 2 & 3 RECONSTRUCTION IN COUNCIL BLUFFS
I 29/I 80 IN COUNCIL BLUFFS, I 29, NORTH OF NEBRASKA AVE TO 0.8
MILES SOUTH OF US 275 INTERCHANGE & FROM JUST WEST OF OF
THE WEST MIXMASTER TO JUST WEST OF MADISON AVE. ON I 80
in COUNCIL BLUFFS, POTTAWATTAMIE COUNTY
located at**

1/4 Section	Section	Township	Range
	1,2,3,4,9-12, 33,36, 6,7,17,18,19	94-95N	44-43W

Coverage Provided Through: 4/25/2017
NPDES Permit Discharge Authorization Number: 21642 - 21409
Discharge Authorization Date: 4/25/2012

**Project Description: MULTI-LANE RECONSTRUCTION AND NEW ROAD
CONSTRUCTION IN COUNCIL BLUFFS. 1066 ACRES**



STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR
KIM REYNOLDS, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
ROGER L. LANDE, DIRECTOR

April 25, 2012

MELISSA SERIO
IOWA DEPARTMENT OF TRANSPORTATION
800 LINCOLN WAY
AMES, IA 50010

Re: Authorization of a Storm Water Discharge Associated With Construction Activity
Iowa Department of Natural Resources, NPDES General Permit No. 2
DNR Authorization Number: IA - 21642 - 21409
Facility Name and Location: IDOT - I29/80 SEGMENT 2 & 3 RECONSTRUCTION IN COUNCIL BLUFFS, COUNCIL
BLUFFS, IA

Dear MELISSA SERIO:

This letter is to acknowledge that a complete Notice of Intent to be covered under Iowa's NPDES Storm Water General Permit No. 2 has been received. Please use the DNR Authorization Number provided above for any future correspondence on this project. By making this Notice of Intent with the DNR, you are committing to meet the terms and conditions in General Permit No. 2. If you do not have a copy of General Permit No. 2 please call (515)281-6782 and request that a copy be sent to you.

In accordance with the terms and conditions in General Permit No. 2, a pollution prevention plan was to have been developed before the Notice of Intent was submitted to the department. The plan is to be implemented at the start of construction and updated accordingly. The pollution prevention plan and other records are to be kept on-site where the storm water discharge occurs. Unless otherwise requested, you do not need to provide a copy to the DNR.

When the construction project has reached final stabilization as defined in the permit, you must submit a Notice of Discontinuation to the DNR (refer to the summary guidance document). Final stabilization is not achieved for residential and commercial developments until all houses and buildings have been constructed and ground surrounding them has been finally stabilized.

If you have questions, please call me at 515-281-6782 or Joe Griffin at 515-281-7017

Sincerely,

A handwritten signature in black ink, appearing to read "Ruth A. Rosdail".

Ruth A. Rosdail
Environmental Specialist
NPDES Permits Section
Environmental Services Division

Enclosure(s): Contact Information Sheet; Permit Authorization Sheet

File No. CON 11 - 34 -- 21642
IDNR Field Office # 4

Iowa DOT Forms

Form 830215: Co-Permittee Certification Statement

Form 830214: Storm Water Site Inspection Report

Storm Water Site Inspection Report Instructions

Form 830216: Notice of Discontinuation



Iowa Department of Transportation

CO-PERMITTEE CERTIFICATION STATEMENT

Project No.: _____

County: _____ Proposal ID No.: _____

Prime Contractor: _____

Subcontractor: _____

Address: _____

Telephone No.: _____

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site as part of this certification.

Further, by my signature, I understand that I am becoming a co-permittee, along with the owner(s) and other contractors and subcontractors signing such certifications, to the Iowa Department of Natural Resources NPDES General Permit No. 2 for Storm Water Discharge Associated with Industrial Activity for Construction Activities at the identified site. As a co-permittee, I understand that I, and my company, are legally required under the Clean Water Act and the Code of Iowa, to ensure compliance with the terms and conditions of the storm water pollution prevention plan developed under this NPDES permit and the terms of this NPDES permit.

* Signature: _____

Title: _____

Date: _____

* Certification Statement shall be signed as follows:

Corporation – president or vice-president

Partnership – general partner

Proprietorship - proprietor



STORM WATER SITE INSPECTION

Inspections Made At Least Once Every Seven Calendar Days

Inspection Date and Time: _____
Project Number: _____ County: _____
DNR Authorization Number: **IA** - _____
Inspection Made By: _____ Title: _____

Comments and Observations:

- Provide **station ranges of areas inspected.**
 - o Include types of erosion & sediment control measures (ESCM'S) inspected (such as silt fence, rock check dams, etc.).
- Note any **ESCM's that were installed or areas where stabilization has been completed since previous inspection.**
 - o In lieu of listing all locations, you may include a **reference to specific IDR's** or include a photocopy of notes from a field book.
 - o Record any areas where land disturbing activities have been temporarily or permanently suspended.
 - o Every effort should be made to access all areas of the site, especially critical areas (discharge points). However, if you are unable to access some areas, then record these locations.
 - o Document suspension of inspections and reason for suspension here, such as when inspections will be performed under another project/contract (e.g. if inspections began on a culvert project but will then be covered under the grading project – note the suspension on the last culvert inspection report).
 - o Document the station range if ceasing inspections on only a portion of the project.

Deficiencies Found and Additions Required (Include Specific Locations):

- Include any **new ESCM's that are needed or existing ESCM's that require correction or maintenance.**
 - o **Location information** may include station and Lt., Rt. or Med.
 - o Information needs to be specific enough so deficiency could be located by another individual.
- Note areas where **stabilization is required.**
- Document any **locations of needed housekeeping items,** such as off-site tracking that needs to be cleaned up.
- Include any issues of permit non-compliance, such as visible off-site sediment discharge.

Contractor Notification (Name, Notification Date, and Time of Notification):

- Types of Notification include direct, email, phone, fax, or written order.

Date of Corrective Action (Within 3 Days of Inspection) and Corrective Action Performed:

- If this section is filled in after date of signature below, then date this section.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Inspector's Signature: _____ Date: _____

Contractor's Signature: _____ Date: _____



Form 830216 (03-15)

NOTICE OF DISCONTINUATION
OF A STORM WATER DISCHARGE
COVERED UNDER IOWA NPDES GENERAL PERMIT NO. 2
FOR CONSTRUCTION ACTIVITIES

Name of the Owner or facility to which the storm water discharge general permit coverage was issued: **Iowa Department of Transportation**

COUNTY: _____

PROJECT No.(s): _____

DESCRIPTION: _____

List the complete permit authorization number for the discharge. This number is provided on the bottom of the authorization sheet for General Permit No. 2.

IA - _____ - _____

List the date the construction site reached "final stabilization": _____

"Final Stabilization" means that all soil disturbing activities at this site have been completed, and that a uniform perennial vegetative cover with a density of 70% for the area has been established or equivalent stabilization measures have been employed.

The following certification must be signed in accordance with the signatory requirements of the general permit:

"I certify under penalty of law that disturbed soils at the identified facility have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time. I understand that by submitting this Notice of Discontinuation, I am no longer authorized to discharge storm water associated with industrial activity for construction activities by Iowa Department of Natural Resources NPDES General Permit No. 2, and that discharging pollutants from storm water associated with industrial activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by an NPDES permit.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations."

Name (print)

Title

Signature

Date

This form is to be completed within 20 days following "final stabilization" and submitted to the Office of Construction and Materials.

**STD. SPEC.
SEC. 2105**

Section 2105. Stripping, Salvaging, and Spreading Topsoil

2105.01 DESCRIPTION.

- A.** Strip topsoil and prepare sod.
- B.** Haul, deposit, and spread topsoil.

2105.02 MATERIALS.

For topsoil furnished by the Contractor, provide material meeting the requirements of Articles 4170.09, A, 1 and 4170.09, A, 3, or strip existing topsoil from beneath template fill sections within the project limits if stripping of that topsoil is not already included as part of the project. Replace topsoil stripped from beneath template fill with an equivalent quantity of Class 10 or Embankment-in-Place material at no additional cost to the Contracting Authority.

2105.03 CONSTRUCTION.

Remove topsoil from borrow pits, cuts, or areas to be covered by embankments. Prepare sod. Haul, deposit, and spread topsoil on shoulders, slopes, excavated areas, borrow pits, and other designated areas according to the contract documents.

A. Stripping Topsoil.

Remove topsoil from borrows, cuts, or areas to be covered by embankments.

1. Sod Preparation.

Mow, or remove, weeds, grass and growing crops or other herbaceous vegetation close to the ground as directed by the Engineer. Shred sod by shallow plowing or blading and thoroughly disking. Shred sod thoroughly enough to permit the soil to be easily spread in a thin layer over areas to be covered.

2. Topsoil Excavation.

After existing sod has been prepared, remove the topsoil to the depth specified. If not otherwise specified, the depth shall be 12 inches. The topsoil may be moved directly to an area where it will be used or may be stockpiled for future use.

B. Placing Topsoil.

Haul, deposit, and spread topsoil uniformly on shoulders, slopes, excavated areas, borrows, and other designated areas according to the contract documents to a minimum depth of 4 inches or to the depth specified in the contract documents. Smooth the surface of the topsoil and leave in a finished condition so that it will drain properly.

2105.04 METHOD OF MEASUREMENT.

A. Topsoil Stripped Onsite.

- 1.** The number of cubic yards of topsoil moved will be computed on the basis of a uniform 12 inch cut, or the depth as specified in the contract

documents, over the area involved. Sufficient field measurements will be taken to assure reasonable conformity with the required depth of cut.

2. Topsoil salvaged from excavated areas and paid for as topsoil will not be included in excavation quantities for which payment is made.

B. Topsoil Furnished by Contractor or Previously Stockpiled Onsite.

The number of cubic yards of topsoil will be computed on the basis of a uniform 8 inch placement, or the depth as specified in the contract documents, over the area involved. Sufficient field measurements will be taken to assure reasonable conformity with the required depth of placement.

2105.05 BASIS OF PAYMENT.

- A. Payment will be the contract unit price per cubic yard.
- B. Payment is full compensation for preparing, stripping (if required), transporting, and placing the topsoil according to the contract documents.
- C. Overhaul will not be paid for this item.

**STD. SPEC.
SEC. 2601**

Section 2601. Erosion Control

2601.01 DESCRIPTION.

Perform the following erosion control measures on areas within and adjacent to the right-of-way according to the contract documents and this specification:

- Seeding and fertilizing,
- Stabilizing crop seeding and fertilizing,
- Overseeding and fertilizing,
- Mulching,
- Composting,
- Sodding,
- Special ditch control,
- Turf reinforcement mat,
- Slope protection,
- Transition mat, and
- Mowing.

2601.02 MATERIALS.

- A.** Furnish materials meeting the requirements of Section 4169.
- B.** Apply materials at no less than the minimum rate specified in the contract documents. Apply seed for native grass, wildflower, and wetland grass seeding on a PLS basis, as computed by the Engineer.
- C.** Additional compensation will not be allowed for materials in excess of that specified, unless directed by the Engineer.
- D.** If, after application of fertilizer, it is determined by test that the fertilizer fails to comply with minimum requirements, furnish and apply additional fertilizer to comply with minimum requirements as defined in Article 4169.03.
- E.** Perform work in a manner that provides the Engineer the opportunity to verify the quantity of material furnished and the rate of application. Divide project area into small natural areas that are to be constructed as identifiable units. Furnish a tally of the quantities of each material as it is used on each area. This may include the quantities below:
 - Weights from approved scales of truck loads of bulk materials,
 - Other scaled weights,
 - Counts of containers, bags, or bales, or estimates of partially used packages of materials, as approved by the Engineer.
- F.** Provide the Engineer with the opportunity to verify quality and quantities in a manner that will allow continuous operation with minimum delays.
- G.** When handling inoculants and sticking agents, follow safety precautions as specified on the product label.

2601.03 PLACEMENT OF EROSION CONTROL.

A. Equipment.

Use equipment meeting the requirements of Section 2001 and the following, except that other equipment which produces similar results will be considered for approval. Use methods and procedures consistent with equipment manufacturers' recommendations; however, do not operate ground driven equipment at speeds greater than 10 mph.

1. Disk.

When preparing a seedbed on ground having heavy vegetation, use a disk having cutaway blades. Provide for the addition of weight to obtain proper cutting depth.

2. Slope Harrow.

Use a rolling weight attached by heavy chain to a tractor. Use a chain of suitable length, with picks attached and a means of rotating the picks as the rolling weight is pulled in a direction parallel to the movement of the tractor.

3. Field Tiller.

Use equipment designed for preparation of the seedbed to the degree specified.

4. Rotary Tiller.

Use equipment with rotary type blades designed for preparation of seedbed to the degree specified.

5. Spike Tooth Harrow.

Use equipment designed to:

- Provide adjustment of the spike teeth to level the ground, or
- Be used as specified by the Engineer.

6. Compaction Equipment.

a. Cultipacker.

- 1) Use a pull type cultipacker with individual rollers or wheels. Cultipackers having sprocket type spacers between the wheels may be used. Ensure the cultipacker produces a corrugated surface on area being compacted.
- 2) Use a cultipacker that operates separate from other operations. Attachment of cultipacker to the seeder or disk will not be permitted, except when the combined cultipacker seeder is manufactured to operate as a unit. Provide for the addition of weight.

b. Compaction Rollers.

Apply Article 2001.05, A.

c. Hand Tamping Equipment.

Use base plate type hand tamping equipment adapted to the performance of the work. Obtain the Engineer's approval.

d. Expanded Mesh Roller.

Use open grid type equipment or the cultipacker type equipment modified by covering with expanded metal mesh.

7. Hydraulic Seeder and Mulcher.

- a. Use hydraulic seeding equipment with a pump rated at no less than 100 gallons per minute. Inoculant, seed, and fertilizer may be applied in a single operation, unless stated otherwise in the contract documents. Apply hydraulic mulch as a separate operation. Ensure the equipment has suitable working pressure and a nozzle adapted to the type of work.
- b. Ensure supply tanks have a means of mechanical agitation. Calibrate the tanks and provide a calibration stick or other approved device to indicate the volume used or remaining in the tank.

8. Gravity Seeders.

- a. Ensure gravity seeders:
 - Provide agitation of the seed,
 - Have an adjustable gate opening, and
 - Uniformly distribute seed on the prepared seedbed.
- b. Use a seed hopper equipped with baffle plates spaced no more than 2 feet apart. Ensure baffle plates extend from the agitator shaft to within approximately 2 inches of the top of the seed hopper.
- c. Wind guards will be required to facilitate seeding when moderate wind conditions exist and when required by the Engineer. Place wind guards in front or in back (or both) of the seed outlet and extend to near the ground line.
- d. This seeder may be used for the application of fertilizer.

9. Endgate Cyclone Seeders.

Ensure endgate cyclone seeders are:

- Suitably mounted,
- Provide movement by mechanical means, and
- Drop through an adjustable flow regulator onto a rotating, power driven, horizontal disk or fan.

10. Hand Cyclone Seeders.

Use a seeder that drops seed through an adjustable flow regulator onto a rotating, hand driven, horizontal disk or fan.

11. Native Grass Seed Drill.

Use a drill that:

- Is free of soil and seed when it arrives on the project,
- Accurately meters and uniformly mixes various seed types throughout drilling operation,
- Provides separate seed boxes to apply both small seeds and a large box with an aggressive picker wheel for continual mixing and applying fluffy bearded seed,
- Has disc furrow openers and packer assembly wheels that compact soil directly over drill rows,
- Contains a no till attachment manufactured by same manufacturer as the drill, and
- Has dimensions to ensure it maintains uniform soil contact over seeded area without bridging.

12. Pneumatic Seeder.

Use a pneumatic (air blower) system with enough power and hose to reach 300 feet.

13. Aerial Equipment.

When aerial application of seed and fertilizer is specified, use aerial equipment capable of providing a uniform distribution of seed and fertilizer on the specified area.

14. Straw Mulching Machine.

Use a type that will uniformly apply mulch material over the desired area without excessive pulverization. Excessive pulverization is the general absence of straw longer than 6 inches after distribution.

15. Mulch Anchoring Equipment.

- a. Use mulch anchoring equipment designed to anchor straw or hay mulch into soil by means of dull blades or disks. Use blades or disks that:
 - Are flat,
 - Are spaced at approximately 8 inch intervals.
- b. The blades may have cutaway edges. Pull mulch anchoring equipment using mechanical means.

16. Mechanical Trencher.

Use a machine designed for the specific purpose of constructing a trench for placement of check slots to depth specified.

17. Mowers.

Use rotary, flail, disk, or sickle type mowers that do not bunch or windrow mowed material.

18. Slit Seeder.

Use a gas, diesel, or electric powered mechanical slit seeder that:

- Is capable of cutting vertical grooves a maximum of 1/4 inch deep into the soil with a maximum horizontal blade spacing of 3 inches,
- Deposits metered seed directly behind the vertical grooves, and
- Contains packer wheels that press and firmly pack seed into the soil.

19. Drop Seeder.

One piece of equipment containing the following:

- Pulverizer rollers in front of the seed tubes.
- Ground driven seed meters.
- Max seed tube spacing of 3 inches delivering seed between the pulverizer rollers and packer wheels.
- Packer wheels pressing and firmly packing seed into the soil.

B. Seeding and Fertilizing.

1. On various portions of the right-of-way, except the traveled portion of the roadbed:

- Prepare the seedbed,
 - Furnish, sow, and cover the seed, and
 - Compact the seedbed.
2. Seed other areas as may be indicated in the contract documents or directed by the Engineer. The limits of areas to be seeded will be clearly marked before seedbed is prepared.
 3. Do not disturb areas having a satisfactory growth of desirable grasses or legumes.
 4. Sow seed only at times of the year when temperature, moisture, and climatic conditions will promote germination and plant growth. Normal seed application dates are according to Article 2601.03, C for each seed type. Perform seeding according to the following procedures:
 - a. **Seedbed Preparation.**
 - 1) Ensure area to be seeded is relatively smooth. Fill washes and gullies to conform to desired cross section. When such fills exceed 6 inches, compact the material with a tractor wheel or other suitable field equipment. Coordinate preparation of ditches designated for special ditch control with the seedbed preparation.
 - 2) Thoroughly work areas accessible to field machinery to a depth of no less than 3 inches. Use mechanical rotary tillage equipment to prepare the seedbed on earth shoulders, urban or raised medians, rest areas, and islands. Hand prepare areas inaccessible to field machinery to a depth of not less than 2 inches. Ensure entire width of shoulder and areas around headwalls, wingwalls, flumes, and other structures are prepared in the manner specified.
 - 3) Where enough vegetative growth exists to sufficiently interfere with proper seedbed preparation, mow vegetative growth before seeding, at no additional cost to the Contracting Authority.
 - 4) Use crawler type or dual wheeled tractors to prepare seedbeds. Operate equipment in a manner to minimize displacement of soil and disturbance of the design cross section.
 - 5) Prior to rolling with cultipacker, harrow ridging in excess of 4 inches caused by operation of tillage equipment. Prior to permanent seeding, roll the area with no less than one pass of the cultipacker.
 - 6) Remove ruts that develop during the sequence of operations before subsequent operations are performed.
 - 7) After completing seedbed preparation, pick up and remove debris according to Article 1104.08, including 3 inch diameter or larger stones, logs, stumps, cable, or other objectionable material that may interfere with seeding operation.
 - b. **Application of Fertilizer.**
 - 1) Spread fertilizer over the areas at the rate designated in Article 2601.03, C for each seed type, unless specified otherwise in the contract documents.

- 2) Spread with a mechanical spreader which will secure a uniform application rate. Do not use truck mounted spreading equipment for bulk fertilizer. On areas accessible to field machinery, spread after the preliminary preparation of seedbed, but prior to sowing of seed. Disk in fertilizer and roll the area prior to application of permanent seed. If the roller cannot be operated satisfactorily, Engineer may permit substituting a harrow for the roller. Areas inaccessible to field machinery, spread fertilizer after preparation of seedbed and thoroughly rake into the soil.
 - 3) If using a hydraulic seeder, apply fertilizer in combination with seeding as specified in Article 2601.03, B, 4, d, 2. When the contract documents require two applications of fertilizer, perform second application during next permanent seeding period following initial seeding and fertilizer application.
- c. Preparation of Seed.**
- 1) For seed mixing, comply with the requirements of Materials I.M. 469.02. Use permanent rural, permanent urban, urban stabilizing, salt tolerant seeding, Native Grass, Wetland Grass, and Wildflower seeding mixtures mixed off-site by a seed conditioner approved by the Iowa Crop Improvement Association or other state's Crop Improvement Association.
 - 2) Inoculate legumes with a standard culture at the rate as specified by manufacturer of inoculant, according to Article 4169.04. Use a type of inoculant specified for each legume seed and approved by the Engineer.
 - 3) Do not allow inoculated seed to be exposed to direct sunlight for more than 30 minutes. Prior to use, reinoculate seed that is not sown within 8 hours after inoculation. Preinoculated seed with manufacturer's recommended protective coating may be used in lieu of seed with Contractor applied inoculant.
 - 4) When gravity or cyclone seeder is used for application of seed, inoculate legume seed according to manufacturer's recommended procedures before mixing with other grass seeds for sowing. If hydraulic seeder is used, inoculant, in quantities specified above, may be applied directly into supply tank with seed, water, and other material. Furnish and apply inoculant.
 - 5) Treat seed with a commercial sticking agent. Apply prior to application of inoculant, or as a mixture when the sticking agent is compatible with other materials, except with hydraulic equipment. A sticking agent optional if a liquid formulation of inoculant is used.
 - 6) Use mechanical mixing equipment to apply sticking agent and inoculant on seed quantities over 50 pounds per batch.
- d. Application of Seed.**
- 1) **Sowing, Covering, and Compaction**
 - a) On areas accessible to field machinery, seed may be sown with:
 - A gravity, cyclone, or hydraulic seeder,
 - A native grass seed drill, or
 - As specified in the contract documents.

- b) On areas inaccessible to field machinery, use of hand cyclone seeders may be used.
 - c) Sowing of seed shall be performed as a split rate application (no less than two passes).
 - d) Covering, compaction, rolling, dragging, or raking of seedbed will not be required provided the friable condition exists. For spring seeding (following fall seedbed preparation) after April 1, Contractor shall roll or harrow when, in the opinion of the Engineer, a friable condition does not exist. Cover stabilizing crop seeding and fertilizing with a light disking or other tillage equipment such as a rigid harrow, spring tooth harrow, or field cultivator.
 - e) Follow sowing of grasses and legumes with at least one complete rolling with cultipacker. Roll shoulders immediately to prevent loss of seed due to air currents caused by passing traffic. For stabilizing crop seeding and fertilizing, follow tillage by rolling area with a cultipacker. If cultipacker cannot be operated satisfactorily, Engineer may permit harrow to be substituted for cultipacker.
 - f) Where compaction equipment will not operate satisfactorily, lightly drag or rake in seeded area by hand. Roll seedbed with a cultipacker before and after seeding.
- 2) Seeding and Fertilizing with Hydraulic Seeder.**
- a) A hydraulic seeder may be used when seedbed has been prepared according to Article 2601.03, B, 4, a. When a hydraulic seeder is used, apply seed or fertilizer, or both, at the rates specified in approximately 400 gallons of water slurry per acre.
 - b) Apply mixture within 1 hour after fertilizer and seed are placed in hydraulic seeder. Use continuous agitation. Seed remaining in the fertilizer solution for more than 1 hour will be unacceptable. Additional seed at the specified rate will be required.
- 3) Pneumatic Seeding.**
- Includes furnishing and applying compost to a depth of 1 inch on designated disturbed areas. Apply compost using a pneumatic (air blower) system with sufficient hose to reach 300 feet. Driving on soil to apply compost will not be allowed. Incorporate fertilizer into full depth of compost material. Prepare seedbed according to Article 2601.03, C, 4, a, 1. Apply seed within top 1/4 inch of compost material.

C. Types of Seeding.

1. Stabilizing Crop Seeding and Fertilizing (Rural).

a. Preparation and Application.

- 1) Prepare seedbed according to Article 2601.03, B, 4, a.
- 2) Prepare seed according to Article 2601.03, B, 4, c.
- 3) Apply seed according to Article 2601.03, B, 4, d.

- 4) For stockpile stabilization seeding, seedbed preparation will not be required for areas not accessible to field equipment.
- b. Seed Mixture.**
Unless otherwise specified in the contract documents, use rates and schedule shown in Table 2601.03-1.

Table 2601.03-1: Rural Stabilizing Crop Seeding Rates and Schedule

March 1 through October 31	
Oat	50 lbs. per acre
Grain rye	50 lbs. per acre
Canada wildrye (<i>Elymus canadensis</i>)	5 lbs PLS. per acre
November 1 through February 28 (or 29)	
Oat	62 lbs. per acre
Grain rye	62 lbs. per acre
Canada wildrye (<i>Elymus canadensis</i>)	7 lbs. PLS. per acre
For stabilizing crop only, Canada wildrye (<i>Elymus canadensis</i>) seed will not be required to be certified as Source Identified Class (Yellow Tag) Source G0-Iowa.	
Canada wildrye (<i>Elymus canadensis</i>) seed shall be debarbed or equal to facilitate application of seed.	

- c. Fertilizing.**
- 1) Apply to seeded areas at the rate of 250 pounds per acre of 13-13-13 (or equivalent) unless specified otherwise in the contract documents.
 - 2) Apply provisions of Article 2601.03, B, 4, b.
- d. Application Dates.**
Refer to Table 2601.03-1 for normal seed application dates.

2. Stabilizing Crop Seeding and Fertilizing (Urban).

- a. Preparation and Application.**
- 1) Use a rotary tiller for preparation of seedbed according to Article 2601.03, B, 4, a. Prior to application of seed, ensure seedbed is firm, smooth, and free of material 1.5 inches in diameter or greater including clods, rocks, and other debris. Roll seedbed before and after application of seed. For rolling, use either open grid type equipment or cultipacker type equipment modified by covering with expanded metal mesh.
 - 2) Prepare seed according to Article 2601.03, B, 4, c.
 - 3) Apply seed according to Article 2601.03, B, 4, d.
 - 4) Prepare, roll, seed, and fertilize areas inaccessible to field equipment by hand or using hand operated equipment, including lawn type, hand cyclone, or gravity equipment.
- b. Seed Mixture.**
Unless specified otherwise in the contract documents, use seeding rates shown in Table 2601.03-2 for urban areas.

Table 2601.03-2: Urban Stabilizing Crop Seeding Rates

Bluegrass, Kentucky ¹	126 lbs. per acre
Ryegrass, Perennial (turf-type variety) ²	40 lbs. per acre

Fescue, Creeping Red	18 lbs. per acre
1. Choose three different cultivars of Kentucky bluegrass, at 42 lbs. per acre each.	
2. Choose two different cultivars of turf-type perennial ryegrass, at 20 lbs. per acre each.	

c. Fertilizing.

1) Apply prior to preparing seedbed.

2) Apply to seeded areas at the rate of 300 pounds per acre of 6-24-24 (or equivalent) unless specified otherwise in the contract documents.

3) Apply provisions of Article 2601.03, B, 4, b.

d. Application Dates.

Seed may be applied throughout the year unless ground conditions are unsuitable for seeding due to moisture or frost.

3. Rural Seeding.

a. Preparation and Application.

1) Prepare seed according to Article 2601.03, B, 4, c.

2) In areas without existing stabilized crop seeding residue, prepare seedbed according to Article 2601.03, B, 4, a, and apply seed according to Article 2601.03, B, 4, d.

3) In areas with existing stabilized crop residue, apply seed with a slit seeder. Seedbed preparation will not be required, except for areas with rills and gullies.

b. Seed Mixture.

Use seeding rates in Table 2601.03-3 for permanent seeding of rural areas, unless otherwise specified in the contract documents:

Table 2601.03-3: Permanent Seed Rates, Rural Areas

Fescue, Tall (Fawn)	100 lbs. per acre
Ryegrass, Perennial (Linn)	75 lbs. per acre
Bluegrass, Kentucky	20 lbs. per acre

c. Fertilizing.

1) Spread over the areas at the rate designated. Unless otherwise specified in the contract documents, use a rate of 300 pounds per acre of 6-24-24 (or equivalent).

2) Apply provisions of Article 2601.03, B, 4, b.

d. Application Dates.

Normal permanent seed application dates are March 1 through May 31, and August 10 through September 30.

4. Urban Seeding.

a. Preparation and Application.

1) Use rotary tiller for preparation of seedbed according to Article 2601.03, B, 4, a. Prior to application of seed, ensure seedbed is firm, smooth, and free of material 1.5 inches in diameter or greater including clods, rocks, and other debris. Roll seedbed before and after application of seed. For rolling, use either

open grid type equipment or cultipacker type equipment modified by covering with expanded metal mesh.

- 2) In areas with existing urban crop stabilizing of 50% or greater density, full seedbed preparation and rolling will not be required. Apply seed using a slit seeder as defined in Article 2601.03, A, 18.
- 3) Prepare seed according to Article 2601.03, B, 4, c.
- 4) Apply seed according to Article 2601.03, B, 4, d.
- 5) Prepare, roll, seed, and fertilize areas inaccessible to field equipment by hand or using hand operated equipment, including lawn type, hand cyclone, or gravity equipment. Obtain Engineer's approval for such equipment.

b. Seed Mixture.

Use seeding rates in Table 2601.03-4 for permanent seeding of urban areas, including areas previously maintained as a lawn.

Table 2601.03-4: Permanent Seed Rates, Urban Areas

Bluegrass, Kentucky ¹	126 lbs. per acre
Ryegrass, Perennial (turf-type variety) ²	40 lbs. per acre
Fescue, Creeping Red	18 lbs. per acre
1. Choose three different cultivars of Kentucky bluegrass, at 42 lbs. per acre each. 2. Choose two different cultivars of turf-type perennial ryegrass, at 20 lbs. per acre each.	

c. Fertilizing.

- 1) Apply prior to preparing the seedbed.
- 2) Spread over the areas at a rate of 300 pounds per acre of 6-24-24 (or equivalent).
- 3) Apply the provisions of Article 2601.03, B, 4, b.

d. Application Dates.

Normal permanent seed application dates are March 1 through May 31, and August 10 through September 30.

5. Native Grass Seeding.

a. Preparation and Application.

- 1) In areas without existing stabilized crop seeding residue, prepare seedbed according to Article 2601.03, B, 4, a. Seed areas accessible to field equipment with native grass seed drill, gravity, or broadcast equipment. Cultipack as specified in Article 2601.03, B, 4, d. Broadcast seed other areas and follow with a light dragging or hand raking.
- 2) In areas with existing stabilized crop residue, apply seed with a native grass seed drill with a no till attachment. Seedbed preparation and cultipacking will not be required. Seedbed preparation is required for areas with rills and gullies.
- 3) Prepare seed according to Article 2601.03, B, 4, c.
- 4) Calibrate native grass seed drill to specified seeding rate for the project prior to operation at the project.
- 5) Plant seed at a maximum 1/8 inch depth. Do not perform seeding when wet soil conditions would cause seed to be placed deeper than specified.

- 6) Fill seed boxes loosely without packing seed to allow agitator wheels to run freely and seed flows freely through drill.
- 7) Set no-till coulters to penetrate between 1/4 and 1/2 inch below soil surface.
- 8) Operate drill so the drive wheel maintains ground contact. Perform two passes with drill, with second pass being offset from first pass.
- 9) Operate tractor between 3 and 5 mph to prevent drill from bouncing.
- 10) Remove seed remaining in drill at the end of each day. At the completion of seeding, remove remaining seed from drill by vacuum or other means. Hand broadcast remaining seed on project.

b. Seed Mixture.

Use seeding rates in Table 2601.03-5 for areas designated for native grass seeding, unless specified otherwise in the contract documents.

Table 2601.03-5: Native Grass Seed Rates

Species (Scientific Name)	Application Rate (PLS)
Furnish seed certified as Source Identified Class (Yellow Tag) Source G0-Iowa. Oats are excluded from this requirement.	
*Big bluestem (<i>Andropogon gerardii</i>)	6 lbs. per acre
*Canada wildrye (<i>Elymus canadensis</i>)	2 lbs. per acre
*Indiangrass (<i>Sorghastrum nutans</i>)	6 lbs. per acre
*Little bluestem (<i>Schizachyrium scoparium</i>)	6 lbs. per acre
Blackeyed susan (<i>Rudbeckia hirta</i>)	4 oz. per acre
Blue vervain (<i>Verbena hastata</i>)	1/2 oz. per acre
Gray-headed coneflower (<i>Ratibida pinnata</i>)	3 oz. per acre
Ironweed (<i>Vernonia fasciculata</i>)	3 oz. per acre
New England aster (<i>Symphotrichum novae-angliae</i>)	2 oz. per acre
Pale purple coneflower (<i>Echinacea pallida</i>)	6 oz. per acre
Partridge pea (<i>Chamaecrista fasciculata</i>)	4 lbs. per acre
Side-oats grama (<i>Bouteloua curtipendula</i>)	4 lbs. per acre
Switchgrass (<i>Panicum virgatum</i>)	1 lbs. per acre
Oats (<i>Avena sativa</i>)	32 lbs. per acre
Butterfly weed (<i>Asclepias tuberosa</i>)	3 oz. per acre
*Note: Canada wildrye, Big bluestem, Indiangrass, and Little bluestem shall be debarbed or equal to facilitate the application.	

c. Fertilizing.

Not required unless specified otherwise in the contract documents.

d. Application Dates.

Normal seed application dates are April 1 through May 31 and November 1 until ground conditions are unsuitable for seeding due to moisture or frost.

6. Wetland Seeding.

a. Preparation and Application.

- 1) In areas without existing stabilized crop seeding residue, prepare seedbed according to Article 2601.03, B, 4, a. Seed areas accessible to field equipment with a native grass seed drill, gravity, or broadcast equipment. Cultipack as specified in Article 2601.03, B, 4, d. Broadcast seed other areas and follow with a light dragging or hand raking.
- 2) In areas with existing stabilized crop residue, apply seed with a native grass seed drill with a no till attachment. Seedbed preparation and cultipacking will not be required. Seedbed preparation is required for areas with rills and gullies.
- 3) Prepare seed according to Article 2601.03, B, 4, c.

b. Seed Mixture.

Use the seeding rates in Table 2601.03-6 for areas designated for wetland grass seeding, unless specified otherwise in the contract documents.

Table 2601.03-6: Wetland Grass Seed Rates

Common Name	Scientific Name	PLS (per ac)
Blue vervain	Verbena hastata	1 oz.
Boneset	Eupatorium perfoliatum	1 oz.
Nodding bur marigold	Bidens cernua	8 oz.
Swamp milkweed	Asclepias incarnata	1 lb.
Sneezeweed	Helenium autumnale	2 oz.
Water plantain	Alisma plantago-aquatica	4 oz.
Arrowhead	Sagittaria latifolia	4 oz.
New England aster	Symphotrichum novae-angliae	2 oz.
Big Bluestem	Andropogon gerardii	1 lb.
Switchgrass	Panicum virgatum	8 oz.
Prairie cordgrass	Spartina pectinata	1 lb.
Virginia wild-rye	Elymus virginicus	5 lbs.
Bluejoint grass	Calamagrostis	1 oz.
Rice cutgrass	Leersia oryzoides	4 oz.
Dark Green bulrush	Scirpus atrovirens	1 oz.
Fox sedge	Carex vulpinoidea	4 oz.
Softstem bulrush	Schoenoplectus tabernaemontani	8 oz.

Spike rush	Eleocharis palustris	4 oz.
Porcupine sedge	Carex hystericina	8 oz.
Broom sedge	Carex scoparia	2 oz.
Tussock sedge	Carex stricta	2 oz.

c. Fertilizing.

Not required unless specified otherwise in the contract documents.

d. Application Dates.

Normal seed application dates are April 1 through June 30.

7. Wildflower Seeding.

a. Preparation and Application.

- 1) Uniformly apply seed to areas with the seedbed prepared as in Article 2601.03, B, 4, a.
- 2) Seed areas accessible to field equipment using a native grass seed drill at an approximate depth of 1/8 inch, or using gravity or broadcast equipment. Cultipack as specified in Article 2601.03, B, 4, d. Broadcast seed other areas and follow with a light dragging or hand raking.
- 3) In areas with existing stabilized crop seeding residue, apply seed with a native grass seed drill with a no till attachment. Seedbed preparation and cultipacking will not be required.

b. Seed Mixture.

As specified in the contract documents.

c. Fertilizing.

Not required unless specified otherwise in the contract documents.

d. Application Dates.

Normal seed application dates are April 1 through May 31 and November 1 until ground conditions are unsuitable for seeding due to moisture or frost.

8. Special Seed.

a. Preparation and Application.

- 1) Apply at the rate specified in the contract documents or as directed by the Engineer as a separate operation either immediately before or immediately after sowing the regular grass mixture.
- 2) No additional work other than sowing of the seed will be required unless specified otherwise in the contract documents.
- 3) On limited areas, this seed may be applied by hand cyclone seeders.

9. Salt Tolerant Seeding.

a. Preparation and Application.

- 1) Prepare seed according to Article 2601.03, B, 4, c.
- 2) Prepare seedbed according to Article 2601.03, B, 4, a, and apply seed according to Article 2601.03, B, 4, d using only a drop seeder according to Article 2601.03, A, 19.

b. Seed Mixture.

Use seeding rates in Table 2601.03-7 for permanent seeding of rural areas, unless otherwise specified in the contract documents:

Table 2601.03-7: Salt Tolerant Seed Rates

Alkali grass	109 lbs. per acre
Turf-type Tall Fescue ¹	109 lbs. per acre
Perennial ryegrass	66 lbs. per acre
Crested wheatgrass	66 lbs. per acre
Hard fine fescue	44 lbs. per acre
Sheep fine fescue	44 lbs. per acre
¹ Turf-type Tall Fescue shall contain a minimum 36 lbs. of each cultivar Inferno and Quest.	

c. Fertilizing.

- 1) Spread over the areas at the rate of 300 pounds per acre of 6-24-24 (or equivalent).
- 2) Apply provisions of Article 2601.03, B, 4, b.

d. Application Dates.

Normal permanent seed application dates are March 1 through May 31, and August 10 through September 30.

D. Overseeding and Fertilizing.

1. Seedbed preparation will not be required, provided overseeding is applied when ground is friable from frost action after February 1 and before April 1 or as directed by the Engineer.
2. When, in the opinion of the Engineer, a friable soil condition does not exist, roll with a cultipacker or harrow.
3. Areas with rills or gullies require seedbed preparation according to Article 2601.03, B, 4, a.
4. Apply fertilizer according to Article 2601.03, B, 4, b.
5. Prepare seed according to Article 2601.03, B, 4, c.
6. Apply seed according to Article 2601.03, B, 4, d unless specified otherwise in the contract documents.
7. Overseeding will not be allowed on more than 1 inch of snow cover.

E. Mulching.

Mulch seeding areas unless otherwise designated otherwise in the contract documents. For disturbed areas that are mulched only, scarify area to a 3 inch depth prior to mulching.

1. Time of Mulching.

Apply to areas requiring mulch as soon as seed is sown and final rolling completed.

2. Application of Mulch.

a. Straw Mulch.

- 1) Distribute evenly and uniformly and anchor it into the soil. Use an application rate for reasonably dry material of approximately 1.5 tons per acre of dry cereal straw, native grass straw, or other approved material, depending on the type of material furnished.
- 2) In all accessible mulched areas, anchor mulch into the soil using mulch anchoring equipment with a minimum of two passes. Operate equipment along the contour. Use crawler type or dual wheel tractors for mulching operation. Operate equipment in a manner to minimize displacement of soil and disturbance of the design cross section.
- 3) Crimp/tuck straw to a minimum of 2 inches below ground surface.

b. Hydraulic Mulches.

- 1) Apply at no less than 3000 pounds per acre using standard hydraulic mulching equipment, unless specified otherwise in the contract documents.
- 2) If using with hydraulic seeding, apply as a separate operation.

F. Composting.

Compost may be used as a top dress application or as an incorporated soil amendment.

1. Top dress applications may be used for urban seeding or on soils that are highly erosive or sloped soils to prevent surface or rill erosion and to provide organic material and nutrients needed for vegetative establishment. Ensure areas top dressed with compost have little or no drainage onto them.
2. In highly erosive soils or sloped embankments with drainage onto the area, incorporate compost by mixing it into the top soil a minimum of 2 inches to prevent the compost from washing off the slope.

G. Sodding.

1. Refer to the contract documents for areas to be sodded. Engineer may designate other areas for sodding.
2. Prior to shaping the sodbed, Engineer will define upon the ground the limits of areas to be sodded, and indicate the center lines of waterways. Cover the designated areas with live sod meeting requirements of Article 4169.06.
3. Closely place and properly fit sod against structures and adjacent sod according to the following provisions:
 - a. Preparation of Sodbed.**
 - 1) Shape and prepare surfaces to be sodded. Ensure areas are firm and even surfaces. Ensure they are free of material 1.5 inches in diameter or greater including clods, rocks, and other debris. Ensure ditch channels, slopes, and flumes to be

sodded have a typical cross section as shown in the contract documents.

- 2) Construct ditch channel to secure a relatively level, flat bottom ditch cross section with a minimum depth of 6 inches, measured from the finished sodbed ground line at the edge of the ditch. Scarifying prior to shaping may be necessary to assure the minimum depth. A minimum sod ditch overall width of 7.5 feet (sloping sides) will be required.
 - 3) Use a soil compaction roller complying with Article 2601.03, A, for compaction and reshaping of ditches. Limit layers of fill materials to no more than 8 inches in depth.
 - 4) After the surface of the layer has been smoothed and before material for the next layer is deposited upon it, compact the layer:
 - With no less than one pass of a soil compaction roller per inch of loose thickness of the layer, and
 - Until the roller is supported entirely on its tamping feet.
 - 5) The roller will be considered entirely supported on its tamping feet when the tamping feet penetrate no more than 3 inches into an 8 inch layer being compacted. A single section roller may be necessary for this operation in some locations.
 - 6) Extend the compacted area approximately 6 inches to 12 inches beyond the width of the ditch.
 - 7) After compaction, shape the ditch.
- b. Fertilizer for Sod.**
- 1) Two applications are required (initial and prior to final acceptance). After sodbed preparation and prior to placing sod, fertilize the area to be sodded and the adjacent disturbed area at a rate of 10 pounds per 1000 square feet. Use a commercial fertilizer specified for the project.
 - 2) Place the final application of fertilizer at a rate of 10 pounds per 1000 square feet within 5 calendar days of the end of the 30 calendar day watering period and prior to final acceptance of the project. Place the final application when the grass is dry and with a dry form of fertilizer.
 - 3) For both of the above applications, if the type of fertilizer is not specified, apply 13-13-13 (or equivalent). Spread with a mechanical spreader which will secure a uniform rate of application. Manipulation or mixing with the soil, other than that incidental to Article 2601.03, G, 3, d, will not be required.
- c. Placing Sod.**
- 1) Do not place sod between May 31 and September 1, or on frozen ground unless otherwise directed by the Engineer.
 - 2) Place in rows or strips. On slopes, place strips transverse to the flow of water over the area. On sides and bottoms of ditches and channels, place strips at right angles to center line of channel. Place tightly against each other so that no open joints are apparent.
 - 3) Stagger joints at the ends of sod strips at least 1 foot on adjacent rows or strips of sod. Cut sod to be placed in road ditch channels, intercepting ditches, or sod flumes where the total sodded width is less than 7.5 feet into strips having

lengths equal to the width of the sodded area. At the top of slope or at the edge of a channel, lay sod so water from adjacent areas will have free flow onto the sodded area. In road ditch channels and flumes, begin sodding at the outlet or lower end and progress upward. On slopes, begin sodding at the bottom and progress upward. If necessary to protect sod already laid, furnish (without extra compensation) ladders or planks for workers to use.

- 4) The Engineer may order sod flumes, slopes, and ditch channels to be staked to minimize erosion loss before establishment. Stake sod as shown in the contract documents and as required by the Engineer.

d. Finishing Sod.

- 1) Firm the soil along the edge of the sodded area. Properly shape and smooth the adjacent disturbed area to allow surface water to flow into the sod ditch. Excessive soil placed over the edge of the sod will not be permitted.
- 2) Prepare and seed the seedbed for all rural disturbed areas adjacent to the sod. Rake the seed in. Seed the disturbed area with the following seed mixture at the rate of 2 pounds per 1000 square feet:

Fescue, Fawn	80%
Ryegrass, Perennial	20%

- 3) For urban projects adjacent to sod, use the seed mixture specified for the project. Mulch disturbed area with grass, hay, or straw at the rate of 70 pounds per 1000 square feet.
- 4) After sodding and seeding, water the sod, sodbed, and disturbed areas according to Article 2601.03, I, 2.
- 5) When sod ditches are constructed after October 1, overseed grasses the following spring, between March 1 and April 1, when weather and soil conditions are favorable.
- 6) When initial watering of the sod does not secure adequate bond between the sod and soil, the Engineer may require rolling. If sod is allowed to be placed between May 31 and August 10, and it is not to be staked, roll the sod using equipment approved by the Engineer. Remove from the project sod rejected from sod ditches. Remove from the site any other material not otherwise incorporated into the work.
- 7) In urban areas, islands, and rest areas, roll the sod prior to or following the initial watering using a hand operated, lawn type roller approved by the Engineer.

e. Urban, Island, and Safety Rest Area Sodding.

- 1) Prepare areas to be sodded, except ditch channels, according to Article 2601.03, C, 4, a.
- 2) During the total watering period, mow sod once to a 3 inch height approximately 3 weeks after placement.

H. Special Ditch Control, Turf Reinforcement Mat, Slope Protection, and Transition Mat.

Use material meeting the requirements of Article 4169.10. Engineer will designate areas for each type of work.

1. **Preparation of Area to be Treated with Special Ditch Control, Turf Reinforcement Mat, Slope Protection, and Transition Mat.**
 - a. Shape ditch channel in the same manner as preparing a ditch for sod as provided in Article 2601.03, G, 3, a.
 - b. Apply provisions of Article 2601.03, B, 4, a.
 - c. Remove material 1.5 inches in diameter or greater, including clods, rocks, and other debris, which may prevent contact of the specified material with the seedbed.
 - d. Coordinate preparation and placement of the specified material with the seedbed preparation, seeding (including sticking agent and inoculant), fertilizing, and mulching of the adjacent area of right-of-way.

2. **Special Ditch Control.**
 - a. **Seeding.**
 - 1) Prepare seed according to the provisions of Article 2601.03 B, 4, c. Sow seed prior to placement of special ditch control material according to Article 2601.03 B, 4, d.
 - 2) Seed ditches and depressed medians using the following seeding rates in Tables 2601.03-7 and 2601.03-8:

Table 2601.03-7: Ditches - Outside Shoulder Adjacent to Native Grass Seedings

Oats	25 lbs/Acre
Grain Rye	25 lbs/Acre
Switchgrass (Panicum virgatum)	3 lbs PLS/Acre
Side-oats grama (Bouteloua curtipendula)	4 lbs PLS/Acre
Canada wildrye (Elymus canadensis)	9 lbs PLS/Acre
Virginia wildrye (Elymus virginicus)	5 lbs PLS/Acre
Partridge pea (Chamaecrista fasciculata)	4 lbs PLS/Acre
Note: Canada wildrye shall be debarbed or equal to facilitate the application.	

Table 2601.03-8: Medians and Ditches - Outside Shoulder Adjacent to Rural Seedings

Fescue, Tall (Fawn)	100 lbs. per acre
Ryegrass, Perennial (Linn)	75 lbs. per acre
Bluegrass, Kentucky	20 lbs. per acre

- b. **Fertilizing.**
 - 1) After the area is prepared and prior to laying the special ditch control material, fertilize at the rate specified. Apply provisions of Article 2601.03, B, 4, b. Spread with a mechanical spreader to secure a uniform rate of application. Manipulation or mixing with the soil other than that incidental to Article 2601.03, H, 7, will not be required.
 - 2) If the type of fertilizer is not specified for the project, apply 300 pounds per acre of 6-24-24 (or equivalent) to Medians and Ditches - Outside Shoulder Adjacent to Rural Seedings (Table 2601.03-8).
 - 3) No fertilizer will be required for Ditches - Outside Shoulder Adjacent to Native Grass Seedings.
- c. **Application.**

- 1) Space check slots on ditch channels so one check slot occurs within each 50 foot increment on slopes of more than 4%.
- 2) Apply special ditch control (wood excelsior mat) without tension and in the direction of the flow of water. Where more than one strip is required, lap the lap joint no less than 3 inches. Bury anchor slot on top edge of special ditch control (wood excelsior mat) from 6 inches to 12 inches, as designated by Engineer.
- 3) On junction slots, bury the upslope end of each strip of wood excelsior mat 6 inches. Firmly tamp the soil. Overlap the ends of the special ditch control (wood excelsior mat) at least 12 inches and staple, with the upgrade section on top.
- 4) Staple terminal end at bottom of special ditch control (wood excelsior mat).
- 5) Use staples meeting requirements of Article 4169.10, A. Space staples as shown in the contract documents.

3. Turf Reinforcement Mat (TRM).

a. Seeding.

- 1) Prepare seed according to provisions of 2601.03 B, 4, c. Sow after TRM and soil fill have been placed and prior to laying the special ditch control (wood excelsior mat) according to Article 2601.03 B, 4, d.
- 2) Apply in ditches and depressed medians using rates in Tables 2601.03-7 and 2601.03-8.

b. Fertilizing.

- 1) After TRM and soil fill have been placed and prior to laying special ditch control (wood excelsior mat), apply at the rate specified. Apply provisions of Article 2601.03, B, 4, b. Spread with a mechanical spreader to secure a uniform rate of application. Manipulation or mixing with the soil other than that incidental to Article 2601.03, H, 7, will not be required.
- 2) If the type of fertilizer is not specified for the project, apply 300 pounds per acre of 6-24-24 (or equivalent) to Medians and Ditches - Outside Shoulder Adjacent to Rural Seedings (Table 2601.03-8).
- 3) No fertilizer will be required for Ditches - Outside Shoulder Adjacent to Native Grass Seedings (Table 2601.03-7).

c. Application.

Place type specified on channel or slope after shaping. Apply according to the contract documents. Furnish and apply a minimum of 1 inch of soil suitable for the establishment of vegetation on the TRM. Furnish and apply seed and fertilizer. Furnish and apply special ditch control (wood excelsior mat) one soil fill.

4. Special Ditch Control over Sod.

When shown in the contract documents, place plastic netting or other approved material over sod and staple it in place. Space staples 3 feet apart in the row. Space rows no more than 2 feet apart. Place staples alternately to adjacent rows. No junction slots or check slots are required. Anchor slots and terminal ends will be required.

5. Slope Protection.

a. Seeding.

- 1) Prepare seed according to Article 2601.03, B, 4, c. Sow prior to placement of slope protection according to Article 2601.03, B, 4, d.
- 2) Seed slopes using seeding rates in Tables 2601.03-7 for slopes adjacent to native grass seedings and 2601.03-8 for slopes adjacent to rural seedings.

b. Fertilizing.

- 1) After area is prepared and prior to laying slope protection, fertilize at the rate specified. Apply provisions of Article 2601.03, B, 4, b. Spread with a mechanical spreader to secure a uniform rate of application. Manipulation or mixing with the soil other than that incidental to Article 2601.03, H, 7, will not be required.
- 2) If the type of fertilizer is not specified, apply 300 pounds per acre of 6-24-24 (or equivalent) to slopes adjacent to rural seedings.
- 3) No fertilizer will be required for slopes adjacent to native grass seedings.

c. Application on Backslopes.

- 1) Where erosive gullies or rills have developed in backslope, fill with soil and compact prior to placement of mat.
- 2) Apply slope protection without tension in a perpendicular direction on backslopes. Where more than one strip is required, lap the lap joint no less than 3 inches.
- 3) Bury the slope protection in an anchor slot on the top edge of the backslope from 6 inches to 12 inches, as designated by the Engineer.
- 4) On junction slots, bury the upslope end of each strip of slope protection 6 inches. Firmly tamp soil. Overlap ends of slope protection at least 12 inches and staple, with upgrade section on top.
- 5) Staple terminal end at bottom of slope protection.
- 6) Use staples meeting requirements of Article 4169.10, A. Space staples as shown in the contract documents.

d. Application on Foreslopes.

- 1) If erosive gullies or rills have developed adjacent to shoulder material, fill with suitable soil and compact prior to placement of slope protection.
- 2) Apply slope protection without tension parallel to the roadway on foreslopes. Where more than one strip is required, butt strips together and staple 3 inches from each edge.
- 3) Install staples 3 inches from upside terminal and downside terminal.
- 4) Use staples meeting the requirements of Article 4169.10, A. Space remaining staples as shown in the contract documents.

6. Transition Mat (TM).

a. Seeding

- 1) Prepare seed according to the provisions of 2601.03 B, 4, c. Sow prior to placement of TRM and TM according to Article 2601.03 B, 4, d.
- 2) Seed outlets or channels using rates in Tables 2601.03-7 and 2601.03-8.

b. Fertilizing

- 1) Prior to laying the TRM and TM, apply fertilizer to the area at the rate specified. Apply provisions of Article 2601.03, B, 4, b. Spread with a mechanical spreader to secure a uniform rate of application. Manipulation or mixing with the soil other than that incidental to Article 2601.03, H, 7, will not be required.
- 2) If type of fertilizer is not specified, apply 300 pounds per acre of 6-24-24 (or equivalent) to Medians and Outlets/Channels - Outside Shoulder Adjacent to Rural Seedings (Table 2601.03-8).
- 3) No fertilizer will be required for Outlets/Channels – Outside Shoulder Adjacent to Native Grass Seedings (Table 2601.03-7).

c. Application

- 1) Place TM in channels or outlets at locations specified in the contract document.
- 2) Prior to the placement of the TM, place TRM - Type 2 according to Article 2601.03, H, 3 to extend the entire length and width of the TM. No special ditch control (wood excelsior mat) or soil fill is required under the TM. Seed is placed under the TRM.
- 3) Place TM panels in such a manner as to produce a planar surface.
- 4) Place each TM panel longitudinally with the flow. Overlap panels upstream over downstream, and/or upslope over downslope.
- 5) Secure each TM panel to the soil with bullet anchors driven 30 inches into the ground. Anchors should be driven through both panels at the edges with overlapping panels. A minimum of eight anchors per panel is required.

7. Finishing Adjacent to Special Ditch Control, Turf Reinforcement Mat, Slope Protection Areas, and Transition Mat.

For adjacent areas disturbed, uniformly shape, fertilize, seed, and rake in the seed in the same manner required for disturbed areas adjacent to sod ditches, except use the seed specified in Article 2601.03, H.

Complete this work during the normal permanent seeding period or by the date specified to complete seeding.

I. Watering.

1. Watering of Special Ditch Control, Turf Reinforcement Mat, Slope Protection, and Transition Mat.

- a. Provide watering equipment and an approved water supply before starting special ditch control, turf reinforcement mat, slope protection, or transition mat work. Water the area no later than the

day following placement of the materials. If Contractor fails to water by second day following placement, a price adjustment will be assessed at a rate of \$200.00 per calendar day until watering has been completed.

- b. Apply three additional waterings at intervals of 5 to 8 calendar days. Perform waterings unless notified by Engineer in writing at least 1 calendar day prior to the day watering is to occur. If Contractor fails to complete watering before the 8th calendar day has elapsed, a price adjustment will be assessed at a rate of \$200.00 per calendar day, beginning on the 9th day, until watering is completed.
- c. Ensure waterings are sufficient to thoroughly saturate seedbed to a depth of approximately 2 inches.
- d. Each watering may require a maximum of 50 gallons of water per square. Apply water as a spray or dispersion to prevent damage to the seedbed. Complete each watering within a 4 hour period.
- e. More than one application for each watering may be necessary to provide adequate saturation without runoff.

2. Watering Sod.

- a. Provide watering equipment and an approved water supply before beginning sodding operation. Six waterings will be required. Allow no more than 1 hour to elapse between laying and initial watering of sod. Perform second, third, and fourth waterings at 4 calendar day intervals; and fifth and sixth waterings at weekly intervals. Perform waterings unless notified by the Engineer in writing at least 1 calendar day prior to the day watering is to occur. A price adjustment will be assessed at a rate of \$200.00 per day for each calendar day that the Contractor fails to complete watering from the day watering is to commence.
- b. Ensure waterings are sufficient to thoroughly saturate sod, sodbed, and adjacent disturbed areas to a depth of approximately 4 inches.
- c. Each watering may require a maximum of 100 gallons of water per square. Apply water as a spray or dispersion to prevent damage to the sod. Complete each watering within a 4 hour period. More than one application for each watering may be necessary to provide adequate saturation without runoff.

J. Mowing.

- 1. Mowing may be required prior to permanent seeding and any time during the growing season following permanent seeding. Engineer will notify Contractor in writing prior to each mowing. Notification may be issued as early as 15 calendar days following execution of the contract. Contractor will be given 5 mowing days, plus 1 additional day for each 50 acre increment, that has been requested to be mowed. A mowing day is a calendar day, exclusive of Saturdays, Sundays, or recognized legal holiday, on which weather or other conditions (not under the control of the Contractor) will permit mowing operations to proceed for no less than 3/4 of a normal work day in the performance of a controlling item of work. When multiple projects are combined into a single contract, mowing days will be administered independently for

each project. Mowing days will be charged starting on the day following the Contractor's notification. A price adjustment will be assessed at a rate of \$200.00 per mowing day after the work was to be completed.

2. Use suitable equipment for mowing. Bunching or windrowing mowed vegetation will not be permitted. When wet soil conditions result in rutting, suspend mowing. Repair rutting damage at the direction of the Engineer at no additional expense to the Contracting Authority. Hand equipment will be required for areas inaccessible to other equipment. Set the cutting height at approximately 6 inches. More than one pass may be required for each mowing.

K. Completion of the Work.

1. Complete all phases of this work, excluding the 30 calendar day maintenance of sodded areas, within the specified construction schedule.
2. If a fertilized or seeded area is damaged by rain prior to the required mulching, refertilize or reseed, or both, that area at a rate not to exceed the specified rate as designated by the Engineer. Perform this work at no additional cost to the Contracting Authority.
3. When any work included in the contract is washed out or damaged prior to final acceptance of the project, the Engineer may order replacement of the damaged portion at contract unit prices. The Engineer will advise the Contractor of the approximate quantity of replacement required. Perform these repairs during the normal seeding period for the seed type. Maintain the work in a manner satisfactory to the Engineer. Should the repair work not be done with reasonable promptness, payment for repair will be limited to the work described at the time of notification.
4. The Contractor is responsible for replacement in addition to the quantity directed by the Engineer to complete the work in an acceptable condition should the Contractor fail to:
 - Make this replacement when directed by the Engineer, or
 - Perform necessary maintenance to the area.

2601.04 METHOD OF MEASUREMENT.

Measurement for the various items of work involving erosion control, satisfactory completed, will be as follows:

- A. Engineer will compute in acres to the nearest 0.1 acre the surface areas of
 - Seeding and Fertilizing,
 - Stabilizing Crop Seeding and Fertilizing,
 - Native Grass Seeding,
 - Wetland Grass Seeding,
 - Wildflower Seeding,
 - Seeding Special Areas,
 - Overseeding and Fertilizing,

- Mulching, and
 - Composting.
- B.** Surface areas of Sodding: squares of 100 square feet calculated from measurements to the nearest foot.
- C.** Debris picked up and removed according to Article 2601.03, B, 4, a: cubic yards by cross sectional measurement or in the hauling units, at the option of the Engineer.
- D.** Special Ditch Control, Turf Reinforcement Mat, and Slope Protection: squares of 100 square feet calculated from measurements to the nearest foot. Measurement of actual ditch area covered will be used, but will not exceed an area based on the actual measured length and design width. Materials used for anchor slots, junction slots, check slots, terminal folds, lap joints seed, and fertilizer are incidental.
- E.** Transition Mat: square feet calculated from measurements to the nearest foot.
- F.** Watering: by counting loads from a transporting tank of known volume or by metering.
- G.** Mobilization for watering: by count. Mobilization for the initial watering required at installation of the plant material will not be measured for count.
- H.** Mowing described in Article 2601.03, J: acres to the nearest 0.1 acre of surface area.

2601.05 BASIS OF PAYMENT.

- A.** Payment for the various items of work involved in erosion control will be made as described below.
1. When suitable soil for filling holes, gullies, or washes is not available adjacent to the area to be filled or when soil must be removed, payment for necessary loading and hauling directed by the Engineer will be as extra work according to Article 1109.03, B.
 2. Contract unit price per acre to the nearest 0.1 acres for the following. Payment is full compensation for preparing the area and furnishing and applying each material.
 - Seeding and Fertilizing,
 - Stabilizing Crop Seeding and Fertilizing,
 - Native Grass Seeding,
 - Wetland Grass Seeding,
 - Wildflower Seeding,
 - Seeding Special Areas,
 - Overseeding and Fertilizing, and
 - Composting.

3. For sowing special seed as directed by the Engineer, but not provided for in the contract documents: delivered cost of the seed plus 10% of the contract unit price for Seeding and Fertilizing.
4. Sodding:
 - a. Contract unit price per square.
 - b. Payment is full compensation for:
 - Preparing the sodbed,
 - Furnishing, placing, and finishing the sod,
 - Fertilizing, and
 - Repair of adjacent areas disturbed by the sodding operation.
 - c. Payment will not be allowed for the Sod until the watering, as specified, has been completed. Replace or repair, at the discretion of the Engineer, Sod areas which are damaged by weather or other causes before the specified initial watering has been completed, at no additional cost to the Contracting Authority.
5. Squares of staking of sod flumes, slopes, and ditch channels: 25% of the contract unit price for Sodding in addition to payment for Sodding.
6. Mulch furnished and placed: contract unit price per acre to the nearest 0.1 acre for mulching. Payment is full compensation for preparing the area and furnishing and applying mulch.
7. Debris picked up according to Article 2102.03, C, for grading work:
 - a. Payment for debris pickup of additional boulders resulting from Stabilized Crop Seeding and Fertilizing will be as described in Article 2102.05 for Class 12 boulders. If there is no Class 12 item, payment will be at 10 times the contract unit price for Class 10 excavation.
 - b. Payment for the number of cubic yards of debris picked up and removed in conjunction with other work will be paid at 25% of the contract unit price for Stabilizing Crop Seeding or Seeding and Fertilizing, as applicable.
8. Squares of Special Ditch Control or Special Ditch Control over Sod with material as specified:
 - a. Contract unit price per square.
 - b. Payment is full compensation for the special ditch control preparation and materials. This includes seedbed preparation, seed and fertilizer, special ditch control (wood excelsior mat), stapling and installation of materials.
9. Squares of Turf Reinforcement Mat of the type specified:
 - a. Contract unit price per square.
 - b. Payment is full compensation for the Turf Reinforcement Mat, preparation and materials including shaping channels, ditches and slopes, soil fill, seed and fertilizing, and special ditch control (wood excelsior mat).
10. Squares of Slope Protection with material as specified:

- a. Contract unit price per square.
 - b. Payment is full compensation for the slope protection preparation and materials. This includes seedbed preparation, seed and fertilizer, slope protection, stapling, and installation of materials.
- 11. Square feet of Transition Mat with material as specified:
 - a. Contract unit price per square feet.
 - b. Payment is full compensation for Transition Mat, TRM, preparation and materials including shaping outlets/channels, ditches, soil fill (if required), seed, fertilizer and anchors.
- 12. When a large area is to be watered, the contract documents will include an item for watering. For the quantity of water applied to sod (Article 2601.03, I, 2), and to special ditch control, TRM, slope protection, and TM (Article 2601.03, H, 8), payment will be the predetermined contract unit price per 1000 gallons.
- 13. Mobilization for watering: pre-determined unit price for each mobilization for required watering. Payment will not be made for mobilization for watering for projects identified as erosion control or landscaping. Payment will not be made for mobilization for watering if labor and equipment is already onsite.
- 14. Mowing as described in Article 2601.03, J: contract unit price per acre to the nearest 0.1 acres.
- B. Payment for these items is full compensation for furnishing all materials, equipment, tools, and labor necessary to complete the work according to the contract documents.
- C. Payment will not be allowed for any area seeded until fertilizer and mulch are placed.

Section 2602. Water Pollution Control (Soil Erosion)

2602.01 DESCRIPTION.

- A. Temporary control measures for projects to control water pollution caused by soil erosion. Additional measures are described in Section 2601.
- B. Projects that are regulated by the requirements of Iowa DNR National Pollutant Discharge Elimination System (NPDES), General Permit No. 2, for Storm Water Discharge Associated with Industrial Activity for Construction Activities, will be identified in the contract documents. The Prime Contractor for these projects will be required to complete, sign, and return, along with the signed contract, a certification statement for storm water discharge associated with industrial activity for construction activities. Affected Subcontractors for the project will be required to sign and return an affidavit identifying them as co-permittees with the Contracting Authority prior to starting work.
- C. Coordinate temporary water pollution control work with permanent erosion control work to ensure economical, effective, and continuous erosion control throughout the construction and post construction period.
- D. **Water Pollution Control Quality Control.**
 1. For projects regulated by a NPDES storm water permit, maintain an individual that will be onsite daily during construction activities. This individual shall have completed Iowa DOT Erosion & Sediment Control Basics (ESC Basics) web-based training, which will be valid for 2 years. This individual shall be responsible for coordinating all erosion and sediment control operations. For this daily requirement, the Contractor may subcontract this responsibility.
 2. Additional responsibilities of an ESC Basics trained individual that shall not be subcontracted include:
 - Attend required storm water inspections with the Contracting Authority.
 - Prepare required initial Erosion Control Implementation Plan (ECIP) submittal and ECIP updates.
 - Attend construction progress meetings to discuss erosion and sediment control issues.
 -
 3. For projects regulated by a NPDES storm water permit, maintain an Erosion Control Technician (ECT) on staff, even though the erosion and sediment control portion of the contract may be subcontracted. This individual shall be responsible for overall management of Contractor's quality control program for erosion and sediment control. The ECT is required to obtain certification through the Technical Training and Certification Program (TTCP) of the Department.

2602.02 MATERIALS.

Use materials complying with Division 41.

2602.03 CONSTRUCTION.

- A. Prior to the preconstruction conference furnish the Engineer an initial ECIP for accomplishment of temporary and permanent erosion control.

In the ECIP, include stages for erosion control work to address Contractor's timetable and sequence for major activities or stages on the contract, including:

- Initial controls required prior to land disturbing activities,
 - Number of earthwork balances for the contract,
 - Sensitive areas requiring special consideration,
 - Anticipated suspension of work,
 - Compliance with Pollution Prevention Plan (PPP),
 - Method of erosion control on haul roads and borrow pits, and
 - Removal of excess materials from project.
- B. Obtain the Engineer's acceptance for the ECIP and methods before commencing work. Schedule and perform all operations so erosion control features are placed according to accepted ECIP. Update ECIP as needed to address changes in schedule of operations or staging, weather changes, or other changes required in order to comply with applicable permit requirements.
 - C. Provide immediate, permanent or temporary, water pollution control measures to prevent contamination of adjacent watercourses and property. This work may involve:
 - Constructing or installing silt fence, silt fence for ditch checks, silt ditches, silt dikes, silt basins, and slope drains,
 - Constructing or installing perimeter and slope sediment control devices (straw wattles, wood excelsior logs, or filter socks filled with compost filter material), and

- Using temporary mulches, mats, seeding, or other control devices or methods, as necessary to control erosion and sediment pollution.
- D. Unless otherwise specified, use compost as a filter medium in filter socks, filter berms, or filter blankets for sediment control.
- E. Stabilize disturbed areas, in which construction activity will not occur for a period of 21 calendar days, no later than the 14th calendar day after no construction activity has occurred. Stabilization measures include temporary seeding, permanent seeding, mulching, sod, or other methods the Engineer approves.
- F. Incorporate all erosion control features into the project at the earliest practical time, as outlined in the accepted schedule. Construct water pollution control measures:
- At locations shown in the contract documents and as determined by the Contractor,
 - At locations where conditions develop during construction that were unforeseen during design, or
 - Where needed to control water pollution that develops during normal construction practices.
- G. Maintain water pollution control features in appropriate functional condition from initial construction through completion of the project. Restore siltation control features to their original condition where siltation has reduced their capacity by 50% or more.
- H. Maintenance of Silt Fence and Silt Fence for Ditch Check includes excavation and disposal of silt material trapped by the silt fence or silt fence for ditch checks. Shaping of the ditch bottom to the original ditch template is incidental to this item. Dispose of the silt material off the project unless Engineer approves a suitable site within the project limits. Maintenance also includes repair of silt fence due to undermining, leaning, or fabric becoming unattached from posts. Repair requiring new fabric will be paid for under type of silt fence properly installed and will not be considered maintenance.
- I. Limit clearing and grubbing, excavation, borrow, and embankment operations in progress to an area commensurate with their capability. Progress in keeping the finish grading, mulching, seeding, and other pollution control measures current according to the accepted work schedule. The Engineer may suspend operations if the Contractor fails to provide adequate erosion control measures in a timely manner.
- J. In the event of conflict between these requirements and water pollution control laws, rules, or regulations of other Federal, State, or local agencies, the more restrictive laws, rules, or regulations will apply.
- K. The Contractor is responsible for water pollution control for work outside the right-of-way or easement obtained by the Contracting Authority.
- L. Mobilizations, Erosion Control.**
1. Mobilizations, Erosion Control, applies to projects not identified as erosion control or landscaping and contain a Storm Water Pollution Prevention Plan (SWPPP).
 2. Only one mobilization will be paid for each stage of work described in the ECIP. Within the scope of work defined for each single mobilization described in the ECIP, additional movement due to weather delays or at the option of the Contractor will not be counted as a mobilization.
 3. Separate mobilizations needed for different crews performing work such as silt fence, seeding, or ditch checks will be counted, however, multiple mobilizations will not be paid for a single crew performing different items of erosion control work.
 4. Payment for mobilization applies to contract items from Sections 2601 and 2602, excluding watering, mowing, debris pickup, monitoring well, or removal items.
 5. Additional mobilizations not outlined in the ECIP must be approved by the Engineer.
 6. Payment for mobilization to correct items not properly installed will not be approved. Payment for mobilization will also not be approved if labor, equipment, and materials to perform erosion control are used for other non-erosion control work onsite.
 7. Mobilize with sufficient labor, equipment, and materials to perform erosion control included in ECIP or as ordered or approved by Engineer. Failure to mobilize when erosion control work is needed to comply with the ECIP or PPP, will result in the Engineer, by written order, direct mobilization within 72 hours of a written order.

8. Failure to mobilize within such time period, will result in a deduction of \$750.00 per calendar day from payment due under the contract, except when Engineer extends such time period.
9. Mobilizations, Erosion Control, will not include work provided under the item of Mobilizations, Emergency Erosion Control.

M. Mobilizations, Emergency Erosion Control.

Mobilizations, Emergency Erosion Control, applies to projects not identified as erosion control or landscaping and containing a Storm Water Pollution Prevention Plan (SWPPP).

An emergency will be considered to be a sudden occurrence of a serious and urgent nature which is beyond normal maintenance of erosion control items. Emergency work requires immediate mobilization and movement of necessary labor, equipment, and materials to the emergency site, followed by immediate installation of temporary erosion control measures.

1. Mobilize with sufficient labor, equipment, and materials on job site within eight hours of Engineer's written order to install temporary erosion control items on an emergency basis. Engineer's written order will include a description of required work. Only one mobilization will be paid for work described in the written order.
2. Failure to mobilize within eight hours of written order, will result in a deduction of \$1500.00 per calendar day from payment due under the contract, except when Engineer extends such time period.

N. Removal of Silt Basins.

Fill silt basin with Class 10 material and a minimum of 4 inches of topsoil. Furnish Class 10 material according to Section 2107 and compact by driving over a minimum of two times. Furnish and place topsoil according to Section 2105. Smooth surface of topsoil and leave in a finished condition that drains properly.

2602.04 METHOD OF MEASUREMENT.

Measurement for water pollution control items will be as follows:

A. Silt Ditches.

Linear feet to the nearest 0.1 foot.

B. Silt Fence.

Linear feet to the nearest 0.1 foot.

C. Silt Fence for Ditch Checks.

Linear feet to the nearest 0.1 foot.

D. Silt Dikes.

Linear feet to the nearest 0.1 foot.

E. Silt Basins.

By count for each silt basin.

F. Removal of Silt Fence or Silt Fence for Ditch Check.

Linear feet to the nearest foot.

G. Removal of Silt Basins.

By count for each silt basin removed.

H. Maintenance of Silt Fence or Silt Fence for Ditch Check.

Linear feet to the nearest foot.

I. Perimeter and Slope Sediment Control Device.

Linear feet to the nearest foot of each size.

J. Removal of Perimeter and Slope Sediment Control Device.

Linear feet to the nearest foot.

K. Mobilizations, Erosion Control.

By count for each mobilization in the accepted ECIP and acceptably performed, as well as additional mobilizations ordered or approved by Engineer and acceptably performed. For multi-project contracts, count will be on a per project basis.

L. Mobilizations, Emergency Erosion Control.

By count for each mobilization directed in writing by Engineer and acceptably performed.

2602.05 BASIS OF PAYMENT.

- A.** Payment for water pollution control items will be the contract unit price as described below. Payment for construction of water pollution control items is full compensation for labor, equipment and materials necessary to construct the items according to the contract documents.
- 1. Silt Ditches.**
Per linear foot for the length of silt ditches properly constructed.
 - 2. Silt Fence.**
Per linear foot for the length of silt fence properly installed.
 - 3. Silt Fence for Ditch Checks.**
Per linear foot for the length of silt fence for ditch checks properly installed.
 - 4. Silt Dikes.**
Per linear foot for the length of silt dikes properly constructed.
 - 5. Silt Basins.**
Each for properly constructed silt basins.
 - 6. Removal of Silt Fence or Silt Fence for Ditch Check.**
Per linear foot for the length of silt fence or silt fence for ditch check properly removed.
 - 7. Removal of Silt Basins.**
Each. Payment is full compensation for providing, preparing, transporting, and placing Class 10 material and topsoil. Contractor has the option, at no additional cost to the Contracting Authority, of stripping and stockpiling Class 10 material and topsoil from constructing silt basins for later use in silt basin removal. Overhaul will not be paid for this item.
 - 8. Maintenance of Silt Fence or Silt Fence for Ditch Check.**
Per linear foot for silt fence or silt fence for ditch check properly cleaned out or repaired.
 - 9. Perimeter and Slope Sediment Control Device.**
Per linear foot for length of device of each size properly installed.
 - 10. Removal of Perimeter and Slope Sediment Control Device.**
Per linear foot for the length of device removed.
- B.** Payment for Mobilizations, Erosion Control, and Mobilizations, Emergency Erosion Control, will be at unit prices stipulated in the proposal. If bid items are not included in the proposal then mobilizations for erosion control will be paid at unit prices stipulated below. Mobilization for Erosion Control costs are not included as part of the contract item for "Mobilization" described in Section 2533.
- 1. Mobilizations, Erosion Control.**
The quantity will be paid for at the unit price of \$500.00 each for Mobilizations, Erosion Control, which is full compensation for staged movement of labor, equipment, and materials; and labor, tools, equipment, and incidentals necessary to complete the movement.
 - 2. Mobilizations, Emergency Erosion Control.**
The quantity will be paid for at the unit price of \$1000.00 each for Mobilizations, Emergency Erosion Control, which is full compensation for movement of labor, equipment and materials; and for labor, tools, equipment, and incidentals necessary to complete the movement.
- C.** When it is necessary for the Contractor to clean out, repair, or reconstruct a silt ditch, dike, or basin, the additional payment will be 100% of the contract unit price for construction of that item. When applicable bid items are not in the contract documents, payment for clean out, repair, or reconstruction will be according to Article 1109.03, B.
- D.** If water control measures are required due to the Contractor's negligence, carelessness, or failure to install the controls as a part of the work as scheduled, and are ordered by the Engineer, perform this work at no additional cost to the Contracting Authority.
- E.** All water pollution control features are to be in functional condition before final acceptance of the contract.

**STD. SPEC.
SEC. 4169**

Section 4169. Erosion Control Materials

4169.01 DESCRIPTION.

All materials required to be furnished and described in this section.

4169.02 SEEDS.

- A. Furnish seeds approved for use according to requirements of this section, including specified purity and germination, as shown in Tables 4169.02-1 and 4169.02-2.

Table 4169.02-1: Seeds (Common Names, Scientific Names, Purity, and Germination)

Common Name	Scientific Name	Purity (%)	Germination (%)
DOMESTIC GRASSES			
Bluegrass, Kentucky	<i>Poa pratensis</i>	85	80
Bluegrass, Ky. RAM-1	<i>Poa pratensis</i> -RAM-1	95	85
Bluegrass, Ky. PARK	<i>Poa pratensis</i> -PARK	95	85
Brome, smooth-LINCOLN	<i>Bromus inermis</i>	90	85
Fescue, tall, FAWN	<i>Festuca arundinacea</i> -FAWN	98	85
Fescue, chewings, red	<i>Festuca rubra</i> var. <i>commutate</i>	98	90
Fescue, creeping, red	<i>Festuca rubra</i>	98	85
Fescue, red-PENNLAWN	<i>Festuca rubra</i> PENNLAWN	98	85
Fescue, Tall, Olympic (Fineleaf)	<i>Festuca arundinacea</i> -Olympic	98	85
Fescue, Tall, Rebel (Fineleaf)	<i>Festuca arundinacea</i>	98	85
Fescue, Sheeps	<i>Festuca ovina</i>	98	85
Orchardgrass	<i>Dactylis glomerata</i>	90	90
Red top	<i>Agrostis alba</i>	92	85
Reed Canarygrass	<i>Phalaris arundinacea</i>	98	70
Wildrye, Canada	<i>Elymus Canadensis</i>	95	85
Wildrye, Russian	<i>Elymus junceus</i>	95	85
Ryegrass, Perennial	<i>Lolium perenne</i>	95	90
Timothy	<i>Phleum pratense</i>	99	85
LEGUMES			
Alfalfa, RANGER/VERNAL	<i>Medicago sativa</i>	99	90 ^(a)
Alfalfa, Travois	<i>Medicago</i> spp.	99	90 ^(a)
Birdsfoot Trefoil EMPIRE	<i>Lotus corniculatus</i>	98	85 ^(a)
Crownvetch, Emerald	<i>Coronilla varia</i>	98	70 ^(a)
Hairy Vetch	<i>Vicia villosa</i>	96	85 ^(a)
Lespedeza, Korean	<i>Lespedeza stipulacea</i>	98	80 ^(a)
Red Clover, medium	<i>Trifolium pretense</i>	99	90 ^(a)
Alsike Clover	<i>Trifolium hybridum</i>	99	90 ^(a)
White Clover	<i>Trifolium repens</i>	98	90 ^(a)
NURSE CROP OR STABILIZING CROP			
Oats	<i>Avena sativa</i>	97	90
Rye	<i>Secale cereale</i>	97	90
Sudangrass, PIPER	<i>Sorghum vulgare</i> var. <i>sudanese</i>	98	85

^(a) Includes hard seed.

Table 4169.02-2: Seeds (Common Names, Scientific Names, and PLS)

Common Names	Scientific Names	PLS (%)
*Furnish seed certified as Source Identified Class (Yellow Tag) Source G0-Iowa.		
NATIVE GRASSES		
Big Bluestem*	Andropogon gerardii	30
Little Bluestem*	Andropogon scoparius	30
Switchgrass*	Panicum virgatum	63
Indiangrass*	Sorghastrum nutans	30
Sorghastrum nutans	Bouteloua curtipendula	30
Western Wheatgrass*	Agropyron smithii	56
Buffalograss*	Buchloe dactyloides	60
Sand Bluestem*	Andropogon gerardii, var. paucipilus	30
Blue Grama	Bouteloua gracilis	30
Intermediate Wheatgrass	Agropyron intermedium	70
Slender Wheatgrass	Agropyron trachycaulum, var. unilaterale	70
Prairie Dropseed	Sporobolus heterolepis	65
Sand Dropseed	Sporobolus cryptandrus	65
Sand Lovegrass	Eragrostis trichodes	65
Weeping Lovegrass	Eragrostis curvula	65
Hairy Wood Chess	Bromus purgans	60
Blue-joint grass	Calamagrostis Canadensis	47
Bottlebrush sedge	Carex comosa	62
Tussock sedge	Carex stricta	78
Fox sedge	Carex vulpinoidea	64
Virginia wild-rye	Elymus virginicus	60
Reed manna grass	Glyceria grandis	50
Fowl manna grass	Glyceria striata	72
Common rush	Juncus effuses	80
Rice Cut Grass	Leesia oryzoides	62
Rye grass, annual	Lolium italicum	89
Fowl bluegrass	Poa palustris	72
Green bulrush	Scirpus atrovirens	45
Wool grass	Scirpus cyperinus	78
Soft-stem bulrush	Scirpus vallisidus	78
Indian grass	Sorghastrum nutans	60
Spike Rush	Eleocharis palustris	71
FORBS		
Canada anemone	Anemone Canadensis	72
Marsh milkweed	Asclepias incarnate	25
New England aster	Aster novae-angliae	25
Swamp aster	Aster puniceus	25
Showy tic-trefoil	Desmodium canadense	25
Joe-pye weed	Eupatorium maculatum	66
Boneset	Eupatorium perfoliatum	41
Ox Eye sunflower	Heliopsis helianthoides	38
Blue-flag iris	Iris virginica-shrevii	19
Meadow blazingstar	Liatris ligulistylis	24
Tall blazingstar	Liatris pycnostachya	24
Great blue lobelia	Lobelia siphilitica	13
Reed manna grass	Glyceria grandis	50
Fowl manna grass	Glyceria striata	72

Common Rush	Juncus effuses	80
Rice Cut Grass	Leesia oryzoides	62

- B. Furnish all seeds, including grass, legume, forbs, and cereal crop seeds, from an established seed dealer or certified seed grower. Ensure they meet requirements of the Iowa Department of Agriculture regulations (Iowa Seed Law) and are labeled accordingly. Ensure the test date to determine the percentage of germination requirement was completed within a 9 month period exclusive of the calendar month in which the test was completed. Ensure the seed analysis on the label is mechanically printed.
- C. Approval of all seed for use will be based on the accumulative total of PLS specified for each phase of the work, so that the PLS is not less than the accumulative total of the PLS specified. PLS is obtained by multiplying purity times germination.
- D. If the seed does not comply with minimum requirements for purity and germination and such seed cannot be obtained, the Engineer may approve use of the seed on a basis of PLS or may authorize a suitable substitution for the seed specified.
- E. The accumulative total of Pure Live Seed (PLS) is the product obtained by multiplying the pounds (kilograms) of each seed by the purity and germination percentages expressed as decimals. Calculations will be based on test results of samples taken by the Contracting Authority. If the seeds were not sampled or if these test results are not available, the PLS will be calculated from information shown on the label.

4169.03 FERTILIZER.

Furnish fertilizer of the grade, type, and form specified and that complies with Iowa Department of Agriculture rules and the following requirements:

- A. Fertilizer grade will be identified according to the percent nitrogen (N), percent available phosphoric acid, (P₂O₅), and percent water soluble potassium, (K₂O), in that order. Approval will be based on that identification.
- B. Furnish all fertilizer from an established fertilizer dealer. Ensure guaranteed analysis is provided either through mechanically printed commercial fertilizer bags or through a manufacturer's (not a distributor's) bill of lading.
- C. Fertilizer inspection and acceptance will be according to Materials I.M. 469.03.
- D. Furnish fertilizer of a type that can be uniformly distributed by the application equipment. Fertilizer may be chemically combined or may be furnished as separate ingredients. If supplying chemically combined fertilizer, have each unit of fertilizer chemically combined. Ensure the manufacturer's guarantee indicates compliance with this agreement. If supplying fertilizer as separate ingredients, comply with the following:
 - Each of the separate ingredients of uniform size,
 - Analysis guaranteed by the manufacturer.
 - Mixed using a drum mixer, grinder mixer, or other mechanical mixers.
 - Mixed only by the fertilizer dealer.
- E. When 6-24-24 chemically combined commercial fertilizer has been specified, a combination of ammoniated phosphate (either monoammonium phosphate (11-52-0) or diammonium phosphate (18-46-0)), muriate of potash (granular form), and urea (granular form) may be used.
- F. When 13-13-13 chemically combined commercial fertilizer has been specified, a combination of ammoniated phosphate (either monoammonium phosphate (11-52-0) or diammonium phosphate (18-46-0)), muriate of potash (granular form), and urea (granular form) may be used.
- G. Fertilizer may be furnished in a dry or liquid form.
- H. Furnish a list of the number of containers and a corresponding scale ticket from an approved scale for the fertilizer to be used in the work.
- I. Official samples taken by the Contracting Authority may be tested. A tolerance of minus 1.0% from the guaranteed analysis for each nutrient will be considered substantial compliance.
- J. Ground limestone is to be of the type known as No. 1 fine (70% passing No. 200 sieve) with an analysis of elemental calcium of no less than 37% or no more than 40%.

4169.04 INOCULANT FOR LEGUMES.

An inoculant is a culture of bacteria specifically formulated for legume seeds (alfalfa, clovers, lespedeza, birdsfoot trefoil, hairy vetch, and crownvetch). Ensure the manufacturer's container indicates the specific legume seed to be inoculated and the

expiration date. Use inoculant that meets the requirements of the Iowa Seed Law. Follow the safety precautions specified on the product label.

4169.05 STICKING AGENT.

A sticking agent is a commercial material recommended by the manufacturer to improve adhesion of inoculant to the seed. For quantities less than 50 pounds, the sticking agent need not be a commercial agent; however, the Engineer's approval is required. Apply separately prior to application of inoculant. Follow safety precautions specified on the product label. A sticking agent is not required if a liquid formulation of inoculant is used.

4169.06 SOD.

- A. Use sod consisting of approximately 1 inch of well established turf consisting of live Kentucky bluegrass, unless otherwise specified. Ensure sod is free from roots of trees or brush, stones, and other objectionable materials. Ensure sod is free from all noxious weeds and reasonably free of all other weeds.
- B. Ensure sod is cut in strips of uniform width and thickness with ends square. The Engineer may order the thickness adjusted to meet the sod conditions. Cut sod to the length specified for the use intended. If not specified, cut to a minimum length of 3 feet. Mow sod areas to a height of approximately 1 1/2 inches to 2 inches prior to cutting.
- C. Ensure sod was regularly maintained prior to cutting. Apply pre-emergence weed control chemicals and weed control chemicals for broadleaf weeds.
- D. Roll or stack sod within 1 hour after being cut. The Engineer may approve other methods of handling sod. Take precautions to prevent drying or heating. Do not use sod damaged by heat or dry conditions, or sod cut more than 18 hours before being incorporated into the work.
- E. Sod will be subject to inspection by the Engineer at the job site, and approval of the work constitutes approval of the material.

4169.07 MULCH.

A. Straw Mulch.

Material used as mulch may consist of dry cereal straw or native grass straw. Use Certified Noxious Weed Seed Free Mulch certified by the Iowa Crop Improvement Association or other state's Crop Improvement Associations. Bail cereal or native grass straw the same growing season as the grain was harvested from the plant.

B. Hydraulic Mulches.

Materials used shall be safe to the applicator and adjacent workers, and nontoxic to plants, fish, and other wildlife when properly applied according to EPA and other regulatory agencies.

1. Wood Cellulose Fiber.

- a. Natural or cooked cellulose fiber processed from whole wood chips, or a combination of (50%-50%) cellulose fiber produced from whole wood chips and recycled fiber from sawdust, recycled paper, chipboard, or corrugated cardboard.
- b. Contains a colloidal polysaccharide tackifier adhered to the fiber to prevent separation during shipment and avoid chemical coagglomeration during mixing.
- c. Forms a homogeneous slurry of fibers, tackifier, and water that can be applied with standard hydraulic mulching equipment and be dyed green to facilitate visual metering during application.
- d. Contains no growth or germination inhibiting factors, and has a minimum pH of 4.8.

2. Bonded Fiber Matrix.

- a. Long-strand wood fibers held together by organic tackifiers and bonding agents that, when dry, become insoluble and non-dispersible.
- b. Upon curing (24 to 48 hours) forms a continuous, 100% coverage, flexible, absorbent, erosion-resistant blanket that encourages seed germination.
- c. Manufactured to be applied with standard hydraulic mulching equipment and dyed green to facilitate visual metering during application.
- d. Contains no growth or germination inhibiting factors.
- e. Physical Properties:
 - 1) **Fibers:** Virgin wood, greater than 88% by volume.
 - 2) **Organic Material:** Greater than 96% by volume.
 - 3) **Tackifier:** 8 to 10%.
 - 4) **pH:** 4.8 minimum.
 - 5) **Moisture Content:** 12% ±3%.
 - 6) **Minimum Water Holding Capacity:** 1.2 gallons per pound.

- f. All components pre-packaged by manufacturer to ensure material performance and compliance. Field mixing of additives or any components will not be allowed.
- g. Other products not meeting requirements of Article 4169.07, B, 2, e, may be approved if they meet the following requirements:
 - 1) Contain non-toxic tackifiers that upon drying become insoluble and non-dispersible to eliminate direct raindrop impact on soil according to ASTM D 7101 and EPA 2021.0-1.
 - 2) Contain no germination or growth inhibiting factors and do not form a water-resistant crust that can inhibit plant growth.
 - 3) Hydraulic mulch that is completely photo-degradable or biodegradable.
 - 4) Contain a minimum 90% organic material according to ASTM D 2974.
 - 5) Have a rainfall event (R-factor) of $140 < R$ according to ASTM D 6459.
 - 6) Have a cover factor of $C \leq 0.03$ according to ASTM D 6459.
 - 7) Vegetation Establishment of 400% minimum according to ASTM D 7322.
 - 8) Water Holding Capacity 600% minimum according to ASTM D 7367.

3. Mechanically-Bonded Fiber Matrix.

- a. Long-strand wood fibers and crimped, interlocking synthetic fibers.
- b. Upon curing (2 hours) forms a continuous, 100% coverage, flexible, absorbent, porous, erosion-resistant blanket that encourages seed germination.
- c. Manufactured to be applied with standard hydraulic mulching equipment and dyed green to facilitate visual metering during application.
- d. Contains no growth or germination inhibiting factors.
- e. Physical Properties:
 - 1) **Virgin Wood Fibers:** 73% minimum.
 - 2) **Crimped, Interlocking Synthetic Fibers:** 5% \pm 1%.
 - 3) **Tackifier:** 10% \pm 1%.
 - 4) **Moisture Content:** 12% \pm 3%.
 - 5) **Minimum Water-Holding Capacity:** 1.2 gallons per pound.
 - 6) **pH:** 4.8 minimum.
- f. All components pre-packaged by manufacturer to ensure material performance and compliance. Field mixing of additives or any components will not be allowed.
- g. Other products not meeting requirements in Article 4169.07, B, 3, e, may be approved if they meet the following requirements:
 - 1) Contain non-toxic tackifiers that upon drying become insoluble and non-dispersible to eliminate direct raindrop impact on soil according to ASTM D 7101 and EPA 2021.0-1.
 - 2) Contain no germination or growth inhibiting factors and do not form a water-resistant crust that can inhibit plant growth.
 - 3) Hydraulic mulch that is completely photo-degradable or biodegradable.
 - 4) Contain a minimum 90% organic material according to ASTM D 2974.
 - 5) Have a rainfall event (R-factor) of $175 < R$ according to ASTM D 6459.
 - 6) Have a cover factor of $C \leq 0.01$ according to ASTM D 6459.
 - 7) Vegetation Establishment of 500% minimum according to ASTM D 7322.
 - 8) Water Holding Capacity of 700% minimum according to ASTM D 7367.

4169.08. COMPOST.

- A. Use an organic substance produced by the biological and biochemical decomposition of source-separated compostable materials separated at the point of waste generation. Organic substances may include, but are not limited to:
 - Leaf and yard trimmings,
 - Food scraps,
 - Food processing residues,
 - Manure and/or other agricultural residuals,
 - Forest residues and bark, and
 - Soiled and/or unrecyclable paper and biosolids.
- B. Compost is to contain no visible admixture of refuse or other physical contaminants nor any material toxic to plant growth. Compost is to meet the additional requirements below. All physical requirements are to comply with the United States Composting Council, "Testing Methods for the Examination of Composting and Compost" (TMECC).
 1. **Minimum organic material:** 30% (dry weight basis) as determined by loss on ignition.
 2. **Moisture content:** 30% to 60%. Organic material shall be loose and friable and not dusty.
 3. **Soluble salts:** less than 5.0 ds/m.

4. **Stability:** Carbon dioxide evolution rate less than 8 according to TMECC 5.08-B. Growth screening: Emergence a minimum of 80% for all compost to be vegetated.
5. **pH:** 6.0 - 8.0.
6. **Fecal Coliform:** Comply with TMECC 07.01-B.
7. **Heavy Metals:** Comply with TMECC 04.06 and TMECC 04.13-B.
8. Comply with the following for particle size:
 - **Pneumatic Seeding (Urban):** 100% passing the 1/2 inch screen.
 - **Pneumatic or Mechanical Seeding (Rural):** 100% passing the 1 inch screen, 80% to 90% passing the 3/4 inch screen, and 70% to 80% passing the 1/2 inch screen.
 - **Filter Sock, Filter Berm, and Filter Blanket:** 100% passing the 2 inch screen, 70% to 90% passing the 1 inch screen, and 50% to 70% passing the 1/2 inch screen.

4169.09 STAKES FOR HOLDING SOD.

Use either wood or metal wire stakes for holding sod. Use wood stakes in sandy soils or when the Engineer requires.

A. Wood Stakes.

- 1 to 1 1/2 inches wide, 1/4 to 1/2 inch thick, and 12 inches long.
- Where this length of stake does not provide firm bearing, the Engineer may require stakes of sufficient length to secure firm bearing.

B. Wire Stakes.

- Staples made from No. 11 wire or heavier and with a minimum 2 inch flat spread on the top of the sod.
- Legs at least 6 inches long. The Engineer may require wire legs longer than 6 inches.

4169.10 SPECIAL DITCH CONTROL, TURF REINFORCEMENT MAT, SLOPE PROTECTION, AND TRANSITION MAT.

Comply with the following and meet the requirements of Materials I.M. 469.10.

A. Wire Staples.

Meet the following requirements for wire staples for holding special ditch control wood excelsior mat and special ditch control jute mesh over sod:

1. U-shaped wire staples.
2. Each leg a minimum of 6 inches long. In sandy soil conditions the Engineer may require the length of each leg to be a minimum of 12 inches.
3. No. 11 diameter wire.
4. Staples of sufficient hardness to facilitate installation without bending.

B. Special Ditch Control.

1. Wood Excelsior Mat.

A mat of interlocking wood fibers. Meet the following requirements:

- Plastic netting applied to both sides for holding the excelsior in place.
- Nontoxic to growth of plants and germination of seeds.
- Minimum dry weight of 0.68 pounds per square yard according to ASTM D 6475.
- Furnished in rolls with a uniform width of 48 inches, with a tolerance of minus 1 inch and a minimum length of 80 feet.
- Furnished in plastic bags or otherwise protected to prevent damage from weather and handling.

2. Coconut Fiber Mat.

At the Contractor's option, coconut fiber mat may be substituted for wood excelsior mat for special ditch control. Meet the following requirements:

- Uniform thickness with the coconut fiber evenly distributed over the entire area of the mat.
- Both sides of the mat covered with polypropylene netting attached with cotton thread.
- Minimum dry weight of 0.40 pounds per square yard according to ASTM D 6475.
- Furnished in rolls with a uniform width of 48 inches with a tolerance of minus 1 inch and a minimum length of 80 feet.
- Furnished in plastic bags or otherwise protected to prevent damage from weather and handling.

C. Slope Protection.

Wood excelsior mat, coconut fiber mat, straw mat, or straw coconut mat may be used for slope protection.

1. Wood Excelsior Mats.

A mat of interlocking wood fibers meeting the requirements of Article 4169.10, B, 1. with the following exceptions:

- Plastic netting applied to one or both sides for holding the excelsior in place. Mats without netting where the excelsior is mechanically stitched together to hold it in place may be allowed.
- Minimum dry weight of 0.50 pounds per square yard according to ASTM D 6475.

2. Straw Mat, Straw-Coconut Fiber Mat, or Coconut Fiber Mat.

At the Contractor's option straw mat, straw-coconut fiber mat, or coconut fiber mat may be substituted for wood excelsior mat for slope protection. Meet the following requirements:

- Consistent thickness with the straw, straw-coconut fiber, or coconut fiber evenly distributed over the entire area of the mat.
- The top side of the mat covered with polypropylene netting attached with cotton thread.
- Minimum dry weight (mass) of 0.40 pounds per square yard according to ASTM D 6475.
- Furnished in rolls with a uniform width of 48 inches, with a tolerance of minus 1 inch and a minimum length of 80 feet.
- Furnished in plastic bags or otherwise protected to prevent damage from weather or handling.

D. Netting.

1. Comply with the following mesh netting sizes. A tolerance of plus or minus 0.10 inch applies to netting size.
 - Netting applied on wood excelsior mats: no more than 1 inch by 2 inches.
 - Netting applied on coconut fiber only mats for channel and slope: no more than 3/4 inch by 3/4 inch.
 - Netting applied on the top side of straw and straw-coconut fiber mats for slopes only: no more than 1/2 inch by 1/2 inch.
2. A minimum weight of 9 pounds per 1000 square yards is required for netting for special ditch control or slope protection.

E. Turf Reinforcement Mat (TRM).

1. **Type 1 TRM:** constructed of a web of mechanically or melt-bonded polymer netting, or monofilaments fibers entangled to form a strong and dimensionally stable mat. Bonding methods include polymer welding, thermal or polymer fusion, or the placement of synthetic fibers between two high-strength, biaxially-oriented nets, mechanically bound by parallel stitching with polyolefin thread. Products may contain a degradable component.
2. **Type 2 and 3 TRM:** constructed of a web of mechanically or melt-bonded polymer netting, or monofilaments, or fibers that are entangled to form a strong and dimensionally stable mat. Non-woven bonding methods include polymer welding, thermal or polymer fusion, or the placement of fibers between two high-strength, biaxially oriented nets, mechanically bound by parallel stitching with polyolefin thread. Components are to be 100% synthetic and resistant to biological, chemical, and ultraviolet degradation.
3. **Type 4 TRM:** a high performance/survivability TRM composed of monofilament yarns woven into a resilient uniform configuration. Use mats consisting of a matrix exhibiting very high interlock and reinforcement capacities with both soil and root systems and demonstrating a high tensile modulus. TRMs manufactured from discontinuous or loosely held together by stitched or glued, netting, or composites will not be allowed in this category. Components are to be 100% synthetic and resistant to biological, chemical, and ultraviolet degradation. Use this category when field conditions exist with high loading and/or high survivability requirements.
4. Comply with Table 4169.10-1 for minimum material property and performance requirements:

Table 4169.10-1: Minimum Material Property and Performance Requirements

Property	Property	Test Method	Type 1	Type 2	Type 3	Type 4
Material	Thickness	ASTM D 6525	0.25 in	0.25 in	0.25 in	0.25 in
Material	Tensile Strength ^(a, b)	ASTM D 6818	125 lb/ft	240 lb/ft	750 lb/ft	3000 lb/ft
Material	UV Resistance	ASTM D 4355	80% @ 500 hrs	80% @ 1000 hrs	80% @ 1000 hrs	90% @ 3000 hrs
Performance	Maximum Shear Stress (Channel Applications) ^c	ASTM D 6460	7-9 lb/ft ²	10-11 lb/ft ²	12-14 lb/ft ²	15-16 lb/ft ²
Performance	Maximum	N/A	1:1 (H:V)	1:1 (H:V)	1:1 (H:V)	1:1 (H:V)

	Slope Gradient (Slope Applications)		or flatter	or flatter	or greater	or greater
a. Minimum Average Roll Values, machine direction only. b. Tensile Strength of structural components retained after exposure. c. Maximum shear stress that fully-vegetated TRM can sustain without physical damage or excess erosion (1/2 inch soil loss) during a 30 minute flow event in large scale testing. Acceptable large scale testing protocol includes ASTM D 6460 or independent testing conducted by the Texas Transportation Institute, Colorado State University, Utah State University, or other approved testing facility. Bench scale testing is not acceptable.						

F. Transition Mat.

1. Mat.

- a. Constructed of 85% minimum UV resistant material with a maximum ground cover of 80%.
- b. Meet the requirements of Table 4169.10-2:

Table 4169.10-2: Material Property and Performance Requirements

Property	Test Method	Value
Mass/Unit Area (max)	ASTM D 6566	3 lbs/ft ²
Thickness (min)	ASTM D 6525	0.4 in
Thickness (max)	ASTM D 6525	1.1 in
Tensile Strength (TD)	ASTM D 6818	550 lbs/ft
Percent Open Area (min)	ASTM D 6567	20%
UV Stability	ASTM D 4355	85%

2. Anchoring Devices.

- a. Furnish bullet tip style anchors made of a metal alloy attached to a wire rope.
- b. Anchors capable of withstanding a minimum 300 pounds of pull out resistance in cohesive soils.
- c. Wire rope a minimum of 30 inches in length with a minimum breaking strength of at least 300 pounds.
- d. The top washer a minimum of 3 inches in diameter and constructed of a UV resistant plastic.
- e. Each anchor equipped to allow the retightening of the anchor when deemed necessary by the Engineer.

4169.11 FILTER FABRIC.

Furnish nonwoven polypropylene, UV stabilized filter fabric complying with Table 4169.11-1.

Table 4169.11-1: Filter Fabric Properties

Property	Typical	Minimum
Tensile Strength, lbs	130	115
Grab Elongation, %	70	50
Trapezoidal Tear Strength, lbs	60	50

4169.12 PERIMETER AND SLOPE SEDIMENT CONTROL DEVICE.

A. General.

Interstate and Primary highway projects shall use sediment logs only.

1. Provide wattles, sediment logs, and filter socks consisting of the following materials contained in a tube of photo degradable fabric or synthetic netting:
 - a. Wattles: Cereal straw or native grass straw certified by the Iowa Crop Improvement Association or other state's Crop Improvement Associations as Certified Noxious Weed Seed Free Mulch. Wattles with observed seed heads will not be accepted.
 - b. Sediment logs: Wood excelsior fibers with 80% of the wood excelsior fibers being 6 inches long or longer.
 - c. Filter socks: Compost (from an approved source meeting Article 4169.08) wood chips, or mulch.
2. Fill wattles, sediment logs, and filter socks using a mechanical device. Hand filling of wattles, sediment logs, and filter socks will not be allowed.
3. Ensure wattles, sediment logs, and filter socks do not contain:
 - A visible admixture of refuse or other physical contaminants,
 - Germination or growth inhibiting factors, or
 - Material toxic to plant growth.
4. Ensure wattles, sediment logs, and filter socks have waterproof identification tags printed using permanent ink and containing manufacturer's name and address. For wattles and sediment logs, tags shall be attached to the inside of the netting of each wattle or sediment log. For filter socks, tags shall be attached to the outside of each sock.

5. Approved sediment logs are listed in Materials I.M. 469.10, Appendix E. Wattles and filter socks will be accepted based on the manufacturer's certification.

B. Wattles and Sediment Logs.

Meet the following minimum weight requirements:

- 20 inch sediment logs and straw wattles: 3 pounds per foot with tolerance of 0.25 pounds per foot.
- 12 inch sediment logs and straw wattles: 2 pounds per foot with tolerance of 0.25 pounds per foot.
- 9 inch sediment logs and straw wattles: 1 pound per foot with a tolerance of 0.1 pounds per foot.

C. Filter Socks.

Provide filter socks with a maximum 3/8 inch opening.

INSPECTION & ACCEPTANCE OF SEED

GENERAL

The provisions of this IM shall apply to seed and seed mixtures defined in the plans and Section 4169 of the Standard Specifications.

ACCEPTANCE

Seed

Seeds shall be furnished and labeled in accordance with laws relating to agriculture seeds and the fuels and regulations of Iowa Department of Agriculture. The exception being the information on the tag or label shall be mechanically printed. Each unit of seed furnished shall have a label or tag containing the name and address of the person or company who labeled said seed, kind and variety, percent purity, percent germination, percent hard seed, if present, and date tested. The test date to determine the percentage of germination shall have been completed within a nine-month period prior to seed application exclusive of the calendar month in which the test was completed (for example, seed tested 8/5/12 shall be applied by 5/31/13. If seed is to be applied after 5/31/13, then seed requires a new test).

Prior to seeding, entire lots of seed to be used should be inspected for damage due to rough handling, exposure to moisture or rodents. Evidence of contamination, or other reasons which would indicate the quality of seed is questionable, should be considered cause for holding until the lots or bags in question have been tested before use. Routine monitoring samples for testing will not be required.

If the seed does not comply with minimum requirements for purity and germination, and such seed cannot be obtained, the Engineer may approve use of the seed on a basis of pure live seed (Germination times Purity equals Pure Live Seed) or may authorize a suitable substitution for the seed specified.

Seed Mixing

- On-site Mixing (rural stabilizing crop seeding only):

Prior to seeding operations, the Engineer shall be provided opportunity to inspect seed tickets and witness the mixing of seed varieties for compliance with requirements of the contract requirements. Contractor shall provide weighing equipment or evidence of the weights of pre-bagged seed to demonstrate required application rates.

- Off-site Mixing:

Seed mixtures certified by an approved source may be incorporated into the project. Each shipment to a project shall be accompanied by proper report and certification documents described in this IM. Seed bags shall be tagged with bag weight and lot number corresponding to certification documents.

Each shipment to a project should be inspected for damage, loss or contamination, and sufficiency to demonstrate required application rate. Bags shall arrive onsite from seed conditioner in sealed/unopened bags.

APPROVED SOURCES

Seed mixture from seed conditioners approved by the Iowa Crop Improvement Association may be furnished to Iowa DOT projects on a certification basis.

Seed conditioners approved by other state's Crop Improvement Associations may furnish seed mixtures on a certification basis.

Seed shall be mixed by an approved seed conditioner as described in this IM, but the seed is not required to come from an approved seed conditioner.

CERTIFICATION DOCUMENTS

Certified seed conditioner shall furnish with each shipment a certified seed mixture report and certification sheet (see Appendix A). Each mixture report shall identify the county, project number, contractor or subcontractor, type of seed mixture. Blank forms are available at the Office of Materials website.

Each certification sheet shall be signed by a designated responsible company representative. One copy of the above described documents shall be forwarded to the project engineer at the time of shipment to the project. In addition, one copy shall be sent to the District Materials Engineer in the district in which the project is being administered.

Certified seed mixture reports and seed lot test information for seeds furnished to Department projects shall be kept by the approved seed conditioner for a minimum of three years.

APPROVED SOURCE MONITORING

The District Materials Engineer shall be responsible for establishing and performing a supplier monitoring program at least once per year.

The following items shall be evaluated during a monitor inspection and documented on a Seed Monitor Report form (see Appendix B):

- Project number/customer
- Certification date and certifying scale company of all mixing scales
- Intended seed mixture
- Verification of seed varieties, germination percentage, purity percentage, PLS percentage, date tested, and lot number
- Verification of weighed seed increments and bags
- Labeling and certification/documentation

INSPECTION & ACCEPTANCE FERTILIZER

GENERAL

Article 4169.03 of the Standard Specifications specifies the requirements for all fertilizers.

All fertilizer furnished shall be labeled in accordance with the rules and regulations of the Iowa Department of Agriculture. Their rules and regulations provide for regular monitoring and require that each unit of fertilizer furnished shall provide on the label or on the invoice the net weight, the name and address of the manufacturer and/or distributor and the name and guaranteed analysis of the product.

ACCEPTANCE

Acceptance of fertilizer for Iowa Department of Transportation projects will be based on **bag label analysis for bagged fertilizer or a blend ticket/sheet for bulk fertilizer.**

INSPECTION

Prior to fertilizing, the entire lot of fertilizer to be used should be inspected for damage due to exposure to moisture. Evidence of contamination or other reasons which would indicate the quality of the fertilizer is questionable, would be considered cause for holding until the lots or bags in question have been approved and/or tested before use. The Iowa Department of Agriculture maintains a monitoring program for fertilizers; therefore routine samples for testing will not be required.

SAMPLING PROCEDURES

If sampling is required, the following procedure should be used. From lots of ten bags or more take one core from each of ten bags. When necessary to sample lots of less than ten bags, take 10 cores, but at least one core from each bag present. Take cores as follows: Lay bag horizontally and insert long probe diagonally from end to end. Remove approximately 1 lb. from each bag and combine with other nine samples to make up test sample.

Each bag must be checked for brand and grade before probing for the sample.

Bulk truckloads can be sampled by taking ten vertical cores at uniformly distributed locations throughout the load.

A minimum of 3 lbs. of fertilizer is needed for a complete analysis. Samples should be placed in a plastic sack similar to those used for cement samples.

Liquid fertilizer samples may be taken directly from the mixing vat or from the delivery line. The entire vat must be thoroughly agitated before the sample is taken.

In sampling liquid fertilizer from a point in the delivery line, a sufficient quantity must be pumped out to insure that no unmixed material is in the line before the sample is taken.

Place the sample in a clear 1-quart glass jar or a polyethylene container.

All samples shall be submitted to the Office of Materials with Sample Identification Form #193. The form shall contain the pertinent data, which appears on the label or invoice.

EROSION CONTROL PRODUCTS

GENERAL

Erosion control products shall meet the requirements of applicable Iowa Department of Transportation Specifications.

ACCEPTANCE

Acceptance of erosion control products will be on the basis of manufacturer and brand name approval, except wattles and filter socks which will be accepted based on the manufacturer's certification.

Approved manufacturers and products are listed in the Materials Approved Products Listing Enterprise (MAPLE).

MANUFACTURER & BRAND NAME APPROVAL

To obtain approval, the manufacturer shall submit the following to the Office of Construction and Materials in Ames, Iowa:

1. Product identification including brand name and product number
2. A sample suitable for testing may be requested by the Office of Construction and Materials.
3. The NTPEP test data for products covered by NTPEP.
4. Company information with list of contact personnel and any available product literature.

MONITOR SAMPLING & TESTING

The Office of Construction and Materials may sample and test erosion control products to verify compliance with specifications.

Materials Approved Products List

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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
AEC Curlex Enforcer	10/07/2014	American Excelsior Co.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		American Excelsior Co.		Wood Excelsior
AEC Curlex I	04/24/2014	American Excelsior Co.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Wood Excelsior
AEC Curlex I CL	04/24/2014	American Excelsior Co.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Wood Excelsior
AEC Curlex II CL	04/24/2014	American Excelsior Co.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Wood Excelsior
AEC Curlex Net Free	04/24/2014	American Excelsior Co.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Wood Excelsior
AEC Premier Coconut	04/24/2014	American Excelsior Co.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		American Excelsior Co.		Coconut Fiber
AEC Premier Straw Coconut	10/07/2014	American Excelsior Co.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Straw – Coconut Fiber
AEC Premier Straw-Double Net	10/07/2014	American Excelsior Co.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Straw

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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
AEC Premier Straw- Single Net	10/07/2014	American Excelsior Co.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Straw
C	04/24/2014	Maccaferri, Inc.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		Maccaferri, Inc.		Coconut Fiber
C125	04/24/2014	Tensar North American Green	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		North American Green		Coconut Fiber
C32	04/24/2014	Erosion Control Blanket Inc.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		Erosion Control Systems, Inc.		Two- Sided Coconut
CF072RR	04/24/2014	Greenfix America	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		Greenfix America		Coconut Fiber
CFS072R	10/07/2014	Greenfix America	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Greenfix America		Straw- Coconut Fiber
Duraguard C1	04/24/2014	Erosion Control Systems, Inc.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		Erosion Control Systems, Inc.		Coconut Fiber



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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
ECC-2	04/24/2014	East Coast Erosion Blankets	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		East Coast Erosion Blankets		Double net Coconut Fiber
ECC-3	04/24/2014	East Coast Erosion Blankets	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		East Coast Erosion Blankets		Coconut
ECS-1	10/07/2014	East Coast Erosion Blankets	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		East Coast Erosion Blankets		Straw
ECS-2	10/07/2014	East Coast Erosion Blankets	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		East Coast Erosion Blankets		Two-sided Straw
ECSC-2	10/07/2014	East Coast Erosion Blankets	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		East Coast Erosion Blankets		Straw-Coconut
ECSC-3	10/07/2014	East Coast Erosion Blankets	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		East Coast Erosion Blankets		Straw-Coconut
ECX-2	04/24/2014	East Coast Erosion Blankets	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		East Coast Erosion Blankets		Wood Excelsior
EG-1s	10/07/2014	Ero-Guard, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Ero-Guard, Inc.		Straw

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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
EG-1sRD	10/07/2014	Ero-Guard, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Ero-Guard, Inc.		Straw
EG-2S/C	10/07/2014	Ero-Guard, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Ero-Guard, Inc.		Straw
EG-2s	10/07/2014	Ero-Guard, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Ero-Guard, Inc.		Straw
EXCEL CC-4	04/24/2014	Western Excelsior	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		Western Excelsior		Coconut
EXCEL R-1 (Iowa Special)	04/24/2014	Western Excelsior	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Western Excelsior		Wood Excelsior
EXCEL S-2 (Iowa Special)	10/07/2014	Western Excelsior	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		Western Excelsior		Wood Excelsior
EXCEL SR-1	10/07/2014	Western Excelsior	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Western Excelsior		Straw
EXCEL SS-2	10/07/2014	Western Excelsior	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Western Excelsior		Straw

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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Enviroscape C4000	03/18/2015	Enviroscape ECM Ltd.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10				
Enviroscape S1000	03/18/2015	Enviroscape ECM Ltd.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10				
Enviroscape S2000	03/18/2015	Enviroscape ECM Ltd.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10				
Enviroscape SC3000	03/18/2015	Enviroscape ECM Ltd.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10				
Ero-Mat	10/07/2014	Armco Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Armco Inc.		Straw
Ero-Mat (High Velocity)	10/07/2014	Verdyol Alabama Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Verdyol Alabama Inc.		Straw
Ero-Mat (Standard)	10/07/2014	Verdyol Alabama Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Verdyol Alabama Inc.		Straw
Excelsior Curflex II Iowa Blanket	10/07/2014	American Excelsior Co.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		American Excelsior Co.		Wood Excelsior

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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
High Velocity Curltex III Blanket	10/07/2014	American Excelsior Co.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		American Excelsior Co.		Wood Excelsior
Landlok C2	04/24/2014	SI Corporation	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		SI Corporation		Coconut Fiber
Landlok CS2	10/07/2014	SI Corporation	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		SI Corporation		Straw-Coconut Fiber
Landlok S1	10/07/2014	SI Corporation	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		SI Corporation		Straw
Landlok S2	10/07/2014	SI Corporation	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		SI Corporation		Straw
MA-S1	10/07/2014	Mid American Erosion Control Products	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Mid American Erosion Control Products		Straw
MA-S2	10/07/2014	Mid American Erosion Control Products	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Mid American Erosion Control Products		Straw
Proguard S1/S2	10/07/2014	Erosion Control Systems, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Erosion Control Systems, Inc.		Straw



Materials Approved Products List

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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Rhino Erosion King	10/07/2014	Rhino Seed & Turf Supply	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Rhino Seed & Turf Supply		Straw
Rhino Erosion King II	10/07/2014	Rhino Seed & Turf Supply	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Rhino Seed & Turf Supply		Straw
Robex Shield RS-1	10/07/2014	American Earth Solutions	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Straw
Robex Shield RS-2	10/07/2014	American Earth Solutions	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		American Excelsior Co.		Straw
S1	10/07/2014	Maccaferri, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Maccaferri, Inc.		Straw
S150	10/07/2014	Tensar North American Green	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		North American Green		Straw
S2	10/07/2014	Maccaferri, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Maccaferri, Inc.		Straw
S31	10/07/2014	Erosion Control Blanket Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Erosion Control Systems, Inc.		One-Sided Straw
S32	10/07/2014	Erosion Control Blanket Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Erosion Control Systems, Inc.		Two-Sided Straw

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Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
S75	10/07/2014	Tensar North American Green	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		North American Green		Straw
SC	10/07/2014	Maccaferri, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Maccaferri, Inc.		Straw-Coconut Fiber
SC 150	10/07/2014	Tensar North American Green	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		North American Green		Straw-Coconut Fiber
SNS-1	10/07/2014	Green Solutions	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Green Solutions		Single Net Straw
SNS-2	10/07/2014	Green Solutions	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Green Solutions		Double Net Straw
Soil Guard*	10/07/2014	Mat, Inc.	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Mat, Inc.		Bonded Fiber Matrix
Standard Plus Grade Excelsior Blanket	10/07/2014	Contech Construction Products Inc.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		Contech Construction Products Inc.		Wood Excelsior
Super Plus Grade Excelsior Blanket	10/08/2014	Contech Construction Products Inc.	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10				



Materials Approved Products List

IM 469.10aa - Appendix A

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
US 1S	10/07/2014	US Erosion Control Products	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		US Erosion Control Products		Straw
US 2S	10/07/2014	US Erosion Control Products	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		US Erosion Control Products		Straw
US-2C	04/24/2014	US Erosion Control Products	EROSION CONTROL, SPECIAL DITCH CONTROL & SLOPE PROTECTION	469.10		US Erosion Control Products		Coconut Fiber
US-2S/C	10/07/2014	US Erosion Control Products	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		US Erosion Control Products		Straw / Coconut
WS05	10/07/2014	Greenfix America	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Greenfix America		Straw
WS072	10/07/2014	Greenfix America	EROSION CONTROL, SLOPE PROTECTION ONLY	469.10		Greenfix America		Straw



Materials Approved Products List

IM 469.10ab - Appendix B

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
C-350	04/24/2014	Tensar North American Green	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 1	469.10		North American Green		Type 1
Curlex Enforcer	04/24/2014	American Excelsior Co.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 1	469.10		American Excelsior Co.		Type 1
ECP-2	10/07/2014	East Coast Erosion Blankets	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		East Coast Erosion Blankets		Type 2
ECP-2 10 oz.	10/07/2014	East Coast Erosion Blankets	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		East Coast Erosion Blankets		Type 2
ECP-3	10/07/2014	East Coast Erosion Blankets	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10		East Coast Erosion Blankets		Type 3
Enkamat (R30)	10/07/2014	Profile Products LLC	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		Profile Products LLC		Type 2
Excel PP5- HT.	10/07/2014	Western Excelsior	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10		Western Excelsior		Type 3
Excel PP5- Xtreme	10/08/2014	Western Excelsior	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10		Western Excelsior		Type 4
Excel PP5- Xtreme.	10/08/2014	Western Excelsior	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 4	469.10		Western Excelsior		Type 3



Materials Approved Products List

IM 469.10ab - Appendix B

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Excel PP5-10	10/08/2014	Western Excelsior	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		Western Excelsior		Type 2
Excel PP5-8	04/24/2014	Western Excelsior	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 1	469.10		Western Excelsior		Type 1
Land Lok 1051	10/08/2014	Propex Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		Propex® Inc.		Type 2
Land Lok 300	10/08/2014	Propex Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10		Propex® Inc.		Type 3; Type 4
Land Lok 300	08/12/2015	Propex Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 4	469.10				
Land Lok 450	10/08/2014	Propex Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		Propex® Inc.		Type 2
Macmat R6G	10/08/2014	Maccafferri, Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10		Maccafferri, Inc.		Type 3
Macmat R6P	10/08/2014	Maccafferri, Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10		Maccafferri, Inc.		Type 3
Macmat R8G	10/08/2014	Maccafferri, Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 4	469.10		Maccafferri, Inc.		Type 4

Materials Approved Products List

IM 469.10ab - Appendix B

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
P300	07/01/2015	Tensar North American Green	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10				
P300-LW	04/24/2014	Tensar North American Green	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 1	469.10		North American Green		Type 1
P42	10/08/2014	Erosion Control Blanket Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		Erosion Control Systems, Inc.		Type 2
P550	10/08/2014	Tensar North American Green	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10		North American Green		Type 3
Pyramat	10/08/2014	Propex Inc.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 4	469.10		Propex® Inc.		Type 4
Recyclex TRM	10/08/2014	American Excelsior Co.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		American Excelsior Co.		Type 2
Recyclex TRM-V	10/08/2014	American Excelsior Co.	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10		American Excelsior Co.		Type 2
SC250	07/01/2015	Tensar North American Green	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 2	469.10				
ScourStop	10/13/2014	Hanes Geo Components	EROSION CONTROL, TRANSITION MAT	469.10				Transition Mats



Materials Approved Products List

IM 469.10ab - Appendix B

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
ShoreMax	10/13/2014	Tensar North American Green	EROSION CONTROL, TRANSITION MAT	469.10		Tensar North American Green		Transition Mat
T-Recs High Performance TRM	10/08/2014	East Coast Erosion Blankets	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 3	469.10	Bernville, PA	Landscaping & Construction Solutions.		TRM Type 3
W3000	07/01/2015	Tensar North American Green	EROSION CONTROL, TURF REINFORCEMENT MAT TYPE 4	469.10				



Materials Approved Products List

IM 469.10ac - Appendix C

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Aspen Tack Mulch	04/24/2014	Western Excelsior	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Western Excelsior		
Aspen Turbo Tack	04/24/2014	Western Excelsior	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Western Excelsior		
Bindex BFM	04/24/2014	American Excelsior Co.	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10		American Excelsior Co.		
Bindex Blend WT	04/24/2014	American Excelsior Co.	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		American Excelsior Co.		
Bindex Wood WT	04/24/2014	American Excelsior Co.	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		American Excelsior Co.		
Earthguard FiberMATRIX (Code: mulch)	02/05/2015	Terra Novo	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10				
Earthguard FiberMATRIX (Code: mulch)	02/05/2015	Terra Novo	EROSION CONTROL, MULCH-MECHANICALLY BONDED FIBER MATRIX	469.10				
Eco Matrix	04/24/2014	Profile Products LLC	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Profile Products LLC		

Materials Approved Products List

IM 469.10ac - Appendix C

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
EcoFibre Plus Tackifier	04/24/2014	Profile Products LLC	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Profile Products LLC		
Enviro-Gold PLUS	08/29/2014	Central Fiber	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Central Fiber		
Enviro-Matt	08/29/2014	Central Fiber	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10				
Enviro-Mix PLUS	08/29/2014	Central Fiber	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Central Fiber		
EnviroMatrix FRM	08/29/2014	Central Fiber	EROSION CONTROL, MULCH-MECHANICALLY BONDED FIBER MATRIX	469.10				
Excel Fibermulch II	04/24/2014	American Excelsior Co.	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		American Excelsior Co.		
Flex Guard	09/04/2014	Mat, Inc.	EROSION CONTROL, MULCH-MECHANICALLY BONDED FIBER MATRIX	469.10		Mat, Inc.		Mechanically Bonded Fiber Matrix (MBFM)

Materials Approved Products List

IM 469.10ac - Appendix C

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Flexterra HP-FGM	09/04/2014	Profile Products LLC	EROSION CONTROL, MULCH-MECHANICALLY BONDED FIBER MATRIX	469.10		Profile Products LLC		Mechanically Bonded Fiber Matrix (MBFM)
GFMX	04/24/2014	Western Excelsior	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10		Western Excelsior		
HydroStraw BFM	05/04/2016	HydroStraw LLC	EROSION CONTROL, BONDED FIBER MATRIX FOR SLOPE PROTECTION	469.10				
HydraCM	04/24/2014	Tensar North American Green	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10		Tensar North American Green		
HydraCX/HydraCX Extreme	09/04/2014	Tensar North American Green	EROSION CONTROL, MULCH-MECHANICALLY BONDED FIBER MATRIX	469.10		Tensar North American Green		Mechanically Bonded Fiber Matrix (MBFM)
Hydro-Blanket (BFM)	04/24/2014	Profile Products LLC	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10		Profile Products LLC		
Mat-Blend Plus	04/24/2014	Mat, Inc.	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Mat, Inc.		



Materials Approved Products List

IM 469.10ac - Appendix C

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Mat-Fiber Plus	04/24/2014	Mat, Inc.	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Mat, Inc.		
ProMatrix	04/24/2014	Profile Products LLC	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10		Profile Products LLC		
Second Nature Wood Fiber Blend Plus	08/29/2014	Central Fiber	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10				
Second Nature Wood Fiber Plus	04/06/2015	Central Fiber	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10				
Soil Guard	04/24/2014	Mat, Inc.	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10		Mat, Inc.		
Spray Guard	04/24/2014	Mat, Inc.	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Mat, Inc.		
SprayMatrix FRM	08/29/2014	Central Fiber	EROSION CONTROL, MULCH-MECHANICALLY BONDED FIBER MATRIX	469.10				
SprayMatt	08/29/2014	Central Fiber	EROSION CONTROL, MULCH-BONDED FIBER MATRIX	469.10				



Materials Approved Products List

IM 469.10ac - Appendix C

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Terra- Blend/w.tackifier	04/24/2014	Profile Products LLC	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Profile Products LLC		
Terra-Wood/w.tackifier	04/24/2014	Profile Products LLC	EROSION CONTROL, MULCH-WOOD CELLULOSE FIBER	469.10		Profile Products LLC		



Materials Approved Products List

IM 469.10ad - Appendix D

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
All Season COMPOST	04/24/2014	All Season Landscape Supplies	EROSION CONTROL, COMPOST	469.10		All Season Landscape Supplies		
Bluestem COMPOST	04/24/2014	Bluestem Solid Waste Agency	EROSION CONTROL, COMPOST	469.10		Bluestem Solid Waste Agency		
Chamness COMPOST	04/24/2014	Chamness Technology, Inc	EROSION CONTROL, COMPOST	469.10		Chamness Technology, Inc		
Davenport COMPOST	04/24/2014	Davenport Compost Facility	EROSION CONTROL, COMPOST	469.10		Davenport Compost Facility		
Ever-Green COMPOST	04/24/2014	Ever-Green Inc.	EROSION CONTROL, COMPOST	469.10		Ever-Green Inc.		
Great River COMPOST	04/24/2014	Great River Regional Waste Authority	EROSION CONTROL, COMPOST	469.10		Great River Regional Waste Authority		
Iowa City COMPOST	04/24/2014	City of Iowa City Landfill	EROSION CONTROL, COMPOST	469.10		City of Iowa City Landfill		
Metro COMPOST	04/24/2014	Metro Compost Center	EROSION CONTROL, COMPOST	469.10		Metro Compost Center		
Organic Matters COMPOST	04/24/2014	Organic Matters	EROSION CONTROL, COMPOST	469.10		Organic Matters		

Materials Approved Products List

IM 469.10af - Appendix F

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Abasco, Type 3	04/24/2014	Abasco	EROSION CONTROL, FLOATING SILT CURTAIN	469.10		Abasco		
Aer-Flo, Type 2 DOT (22 oz.)	04/24/2014	Aer-Flo	EROSION CONTROL, FLOATING SILT CURTAIN	469.10		Aer-Flo		
Elastec Type II Fastwater Screen	10/24/2014	Elastec/American Marine	EROSION CONTROL, FLOATING SILT CURTAIN	469.10				
Enviro-USA, Type 2 (22 oz. and 8 inch float)	04/24/2014	Enviro-USA	EROSION CONTROL, FLOATING SILT CURTAIN	469.10		Enviro-USA		

Materials Approved Products List

IM 496.01aa - Appendix A

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Carthage 15%	04/24/2014	Carthage Mills	ENGR. FABRIC FOR SILT FENCING	496.01		Carthage Mills		
FF101 (IA)	04/24/2014	Tencate Geosynthetics Inc.	ENGR. FABRIC FOR SILT FENCING	496.01		Tencate Geosynthetics Inc.		
GTF 400 EO	04/24/2014	Thrace-LINQ, Inc.	ENGR. FABRIC FOR SILT FENCING	496.01		Thrace-LINQ, Inc.		
Geo 2130D	04/24/2014	Propex Inc.	ENGR. FABRIC FOR SILT FENCING	496.01		Propex® Inc.		
Geo Tex 2132 (cord)	04/24/2014	Propex Inc.	ENGR. FABRIC FOR SILT FENCING	496.01		Propex® Inc.		
SCF 1500 I	04/24/2014	Fabtex Solutions, Inc.	ENGR. FABRIC FOR SILT FENCING	496.01		Fabtex Solutions, Inc.		
Style 912	04/24/2014	Belton Industries inc.	ENGR. FABRIC FOR SILT FENCING	496.01		Belton Industries inc.		
Terra-Tex Econofence with netting	04/24/2014	Hanes Geo Components	ENGR. FABRIC FOR SILT FENCING	496.01		Hanes Geo Components		
Terra-Tex SC-32 (belt)	04/24/2014	Hanes Geo Components	ENGR. FABRIC FOR SILT FENCING	496.01		Hanes Geo Components		
Terra-Tex SC-32 (cord)	04/24/2014	Hanes Geo Components	ENGR. FABRIC FOR SILT FENCING	496.01		Hanes Geo Components		
WINFAB 1215DT	04/24/2014	Willacochee Industrial Fabrics, Inc.	ENGR. FABRIC FOR SILT FENCING	496.01		Willacochee Industrial Fabrics, Inc.		



Materials Approved Products List

IM 496.01ac - Appendix C

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
150 EX	04/24/2014	Thrace-LINQ, Inc.	ENGR. FABRIC FOR EROSION CONTROL	496.01		Thrace-LINQ Industrial Fabrics Inc.		
160N	04/24/2014	Tencate Geosynthetics Inc.	ENGR. FABRIC FOR EROSION CONTROL	496.01		TenCate Geosynthetics		
FX-60HS	04/24/2014	Carthage Mills	ENGR. FABRIC FOR EROSION CONTROL	496.01		Carthage Mills		
GT160	04/24/2014	Skaps	ENGR. FABRIC FOR EROSION CONTROL	496.01		Skaps		
Geo Tex 601	04/24/2014	Propex Inc.	ENGR. FABRIC FOR EROSION CONTROL	496.01		Propex Inc.		
MX225	04/24/2014	Maccaferri, Inc.	ENGR. FABRIC FOR EROSION CONTROL	496.01		Maccaferri, Inc.		
NW6	04/24/2014	SRW Products	ENGR. FABRIC FOR EROSION CONTROL	496.01		SRW Products		
TG 600	04/24/2014	Tenax Corp.	ENGR. FABRIC FOR EROSION CONTROL	496.01		Tenax Corporation		
TNS R060	04/24/2014	Crown Resources, LLC	ENGR. FABRIC FOR EROSION CONTROL	496.01		Crown Resources, LLC.		
TS 6600	09/15/2014	ADS (Ida Grove, Hampton, Mendota)	ENGR. FABRIC FOR EROSION CONTROL	496.01		Advanced Drainage Systems, Inc. (Nylo Plast)		
TYPAR 3631G	04/24/2014	US Fabrics Inc.	ENGR. FABRIC FOR EROSION CONTROL	496.01		US Fabrics Inc.		
TerraTex N06	04/24/2014	Hanes Geo Components	ENGR. FABRIC FOR EROSION CONTROL	496.01		Hanes Geo Components.		



Materials Approved Products List

IM 496.01ac - Appendix C

Brand Name	Approved	Company Name	Material Item	IM	Plant Location	Marketer	Terminal/Supplier	Type
Trevira 011200	04/24/2014	Johns Manville, Corp.	ENGR. FABRIC FOR EROSION CONTROL	496.01		Johns Manville Corporation		
WINFAB 600N	04/24/2014	Willacoochee Industrial Fabrics, Inc.	ENGR. FABRIC FOR EROSION CONTROL	496.01		Willacoochee Industrial Fabrics		

Standard Road Plans

EC Standards

EC-101: Wood Excelsior Mat for Ditch Protection

EC-102: Sod for Ditch Protection

EC-103: Wood Excelsior Mat for Slope Protection

EC-104: Turf Reinforcement Mat (TRM)

EC-105: Transition Mat (TM)

EC-201: Silt Fence

EC-202: Floating Silt Curtain

EC-204: Perimeter and Slope Sediment Control Devices

EC-301: Rock Erosion Control (REC)

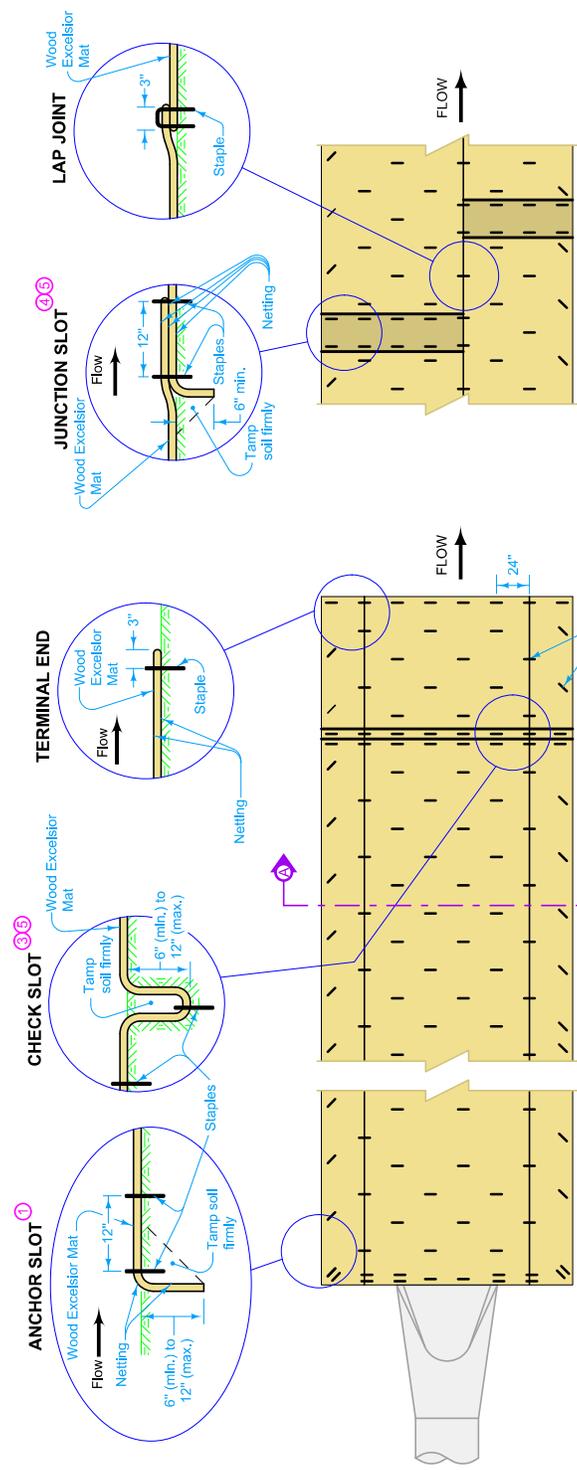
EC-502: Seeding in Rural Areas

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

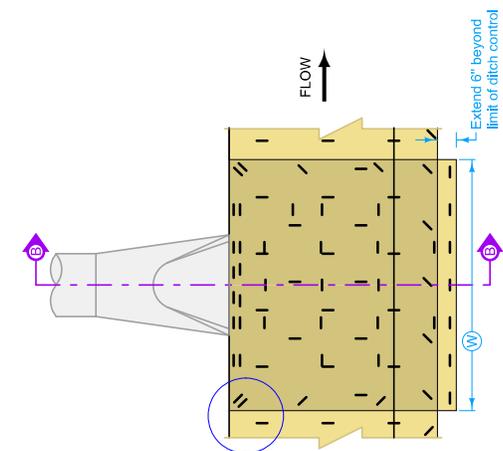
Ensure ground surface adjacent to any channels is shaped to facilitate natural drainage into the protected area.

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.

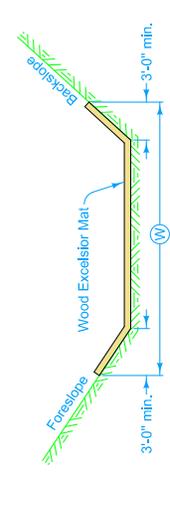
- 1 Install anchor slot at the beginning (upstream end) of all wood excelsior mat installations.
- 2 Place staples alternately in rows approximately 24 inches apart. Approximately 30 staples required per square (100 sq. ft.) of wood excelsior mat.
- 3 Space Check Slots in ditch channel so that one occurs 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.



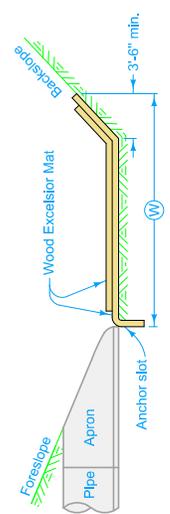
PLAN
(at Junction Slots and Lap Joints)



PLAN
(at Culvert Tranverse to Ditch)



SECTION A-A



SECTION B-B

	REVISION	2	04-19-16
	STANDARD ROAD PLAN EC-101		
SHEET 1 of 1			
REVISIONS: Revised to show placement of erosion control beginning at the end of the apron.			
APPROVED BY DESIGN METHODS ENGINEER 			

Possible Contract Item:
Special Ditch Control, Wood Excelsior Mat
Possible Tabulation:
100-22

SPECIAL DITCH CONTROL

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.

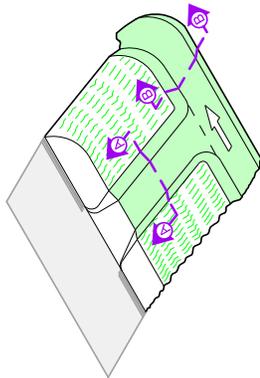
Provide necessary excavation at locations where silt conditions require shaping of a ditch to provide a proper type of area for installation of sod for special ditch control. Dispose excavated material in adjacent area as directed by the Engineer.

At locations where erosion has created gullies in ditches or backslopes, fill and compact gullies in lifts not more than 8-inches thick.

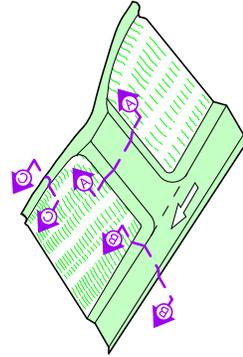
Unless specifically required otherwise by the Engineer, install wire stakes or wood stakes. Stagger wire stakes as shown. Minimum 33 stakes per square. Use wood stakes in sod flumes when designated by the Engineer. When directed by the Engineer, longer stakes may be required for certain soil conditions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

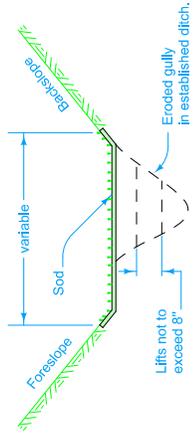
Shaping and grading work necessary to prepare the ground for sodding adjacent to concrete surfaces will not be paid for separately but is incidental to other work on the project. Such grading and shaping may include the removal and disposal of excess earth, as directed by the Engineer, in order to obtain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



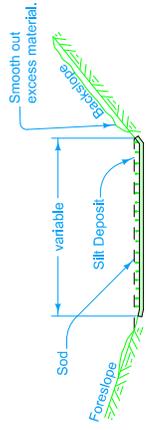
PERSPECTIVE FORE-SLOPE FLUME AND ROADWAY DITCH



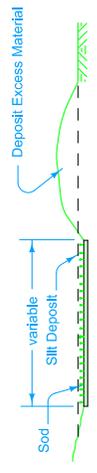
PERSPECTIVE BACK-SLOPE WITH FLUME AND INTERCEPTING DITCH



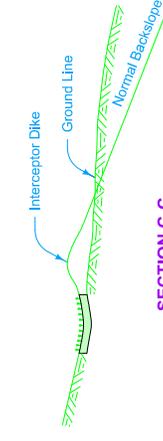
SECTIONS A-A AND B-B
Sod placement for eroded gully.



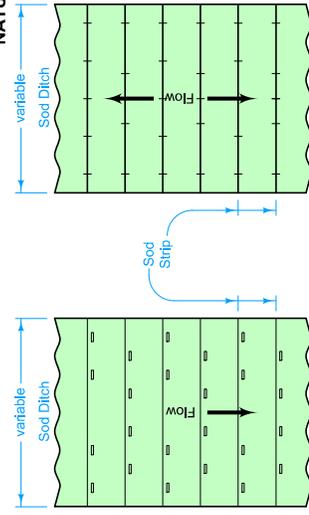
SECTION B-B
Sod placement for silted ditch in cut.



SECTION B-B
Sod placement for silted area in no-ditch section.



SECTION C-C
Sod placement on Interceptor Ditch



4 Wood Stakes per row, staggered in rows

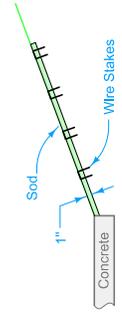


WIRE STAKES

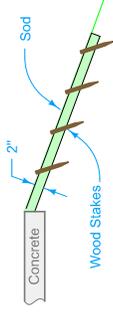
WOOD STAKES

STAKING FOR SOD CHANNELS

CASE 1
NATURAL GROUND SLOPES TOWARD CONCRETE

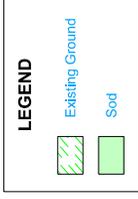


Ground surface shall be graded 1" below the edge of concrete before sod is placed.



Grade ground surface 2" below the edge of concrete before sod is placed.

CASE 2
NATURAL GROUND SLOPES AWAY FROM CONCRETE



	REVISION	1 04-21-15
	STANDARD ROAD PLAN EC-102 SHEET 1 of 1	
REVISIONS: Replaced DOT logo with new version. Replaced Section A-A and B-B drawings to show ditch bottoms being flat.		
APPROVED BY DESIGN METHODS ENGINEER 		
SOD FOR DITCH PROTECTION		

SECTION A-A
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.

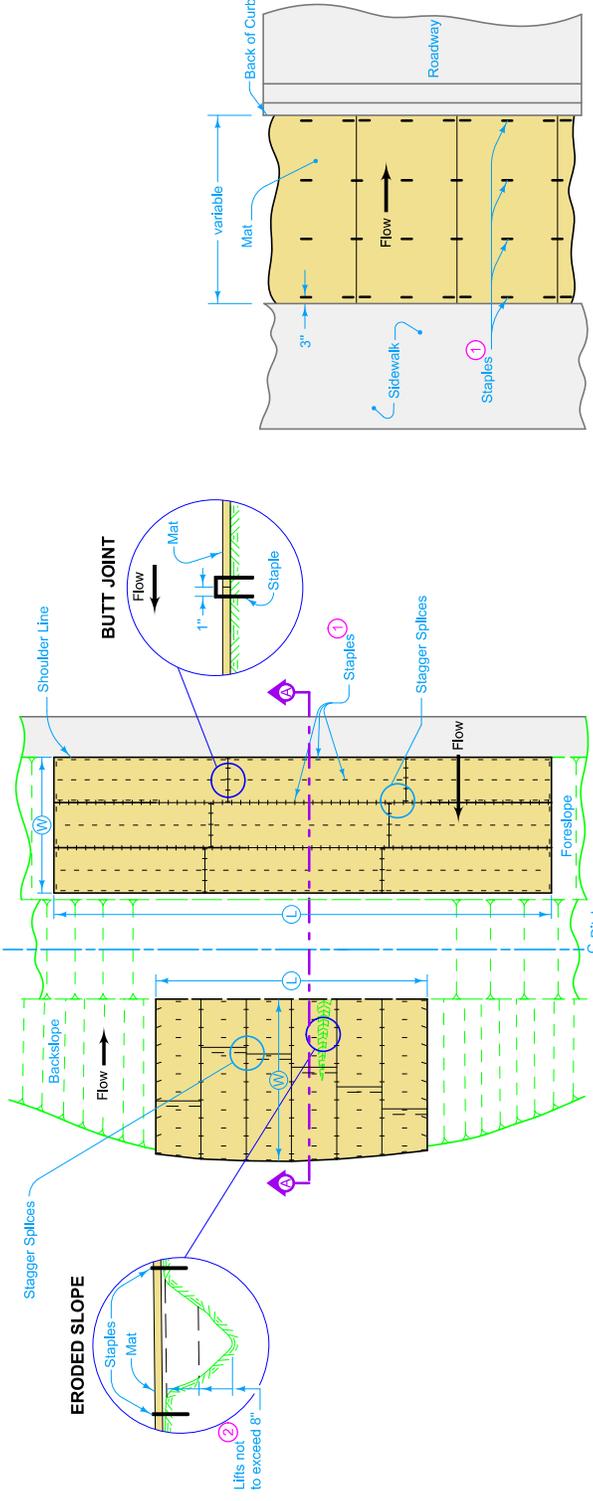
Excelsior mat for backslope protection is installed with strips placed approximately perpendicular to roadway. Locations for slope protection are shown on detail plans.

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 fill 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

IOWA DOT	REVISION	1	04-21-15
	STANDARD ROAD PLAN		
REVISIONS: Removed language from general notes already in the Specifications. Modified drawings. Added Possible Contract Item and Possible Tabulation.			
APPROVED BY DESIGN METHODS ENGINEER			
WOOD EXCELSIOR MAT FOR SLOPE PROTECTION			



PLAN FOR SIDEWALK ADJACENT TO PAVEMENT

PLAN FOR BACKSLOPE AND FORESLOPE PROTECTION

SECTION A-A

DOWNSIDE TERMINAL

UPSIDE TERMINAL

TERMINAL END (Alternate B)

TERMINAL END (Alternate A)

ANCHOR SLOT

LAP SPICE

CENTER BUTT JOINT

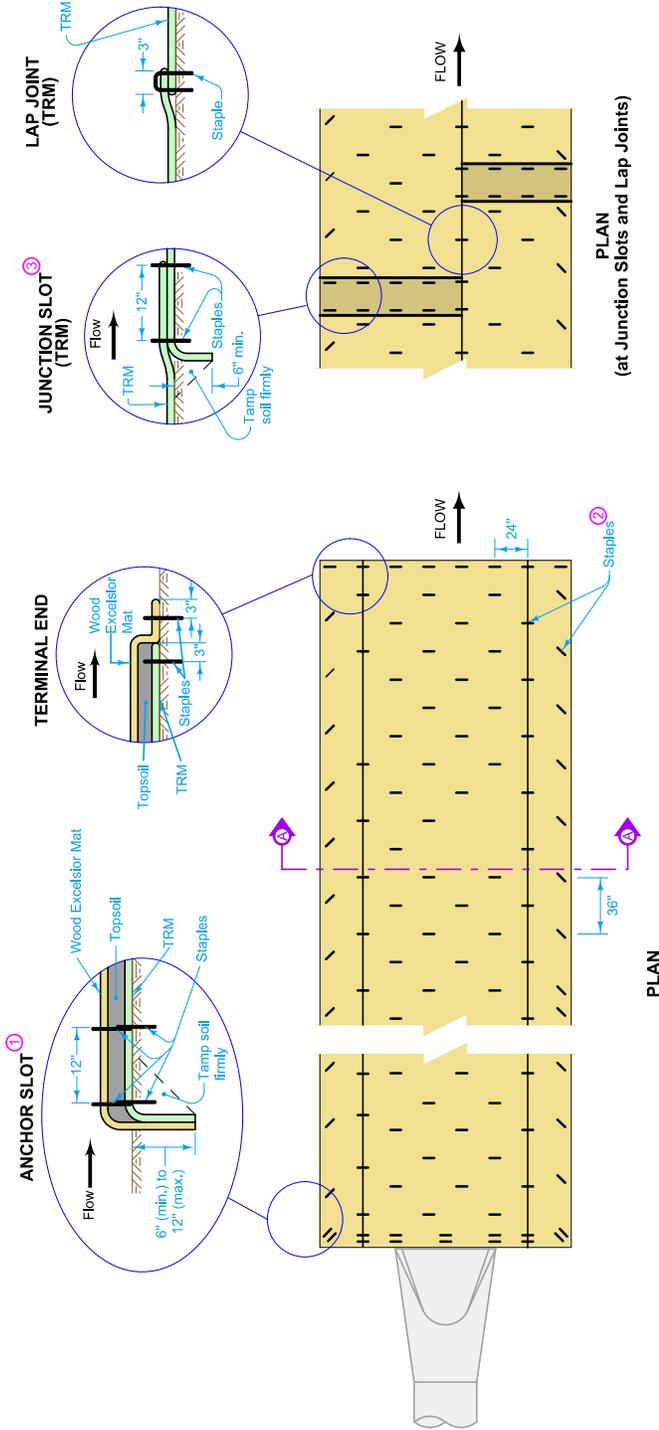
BUTT JOINT

SLOPE PROTECTION MAT

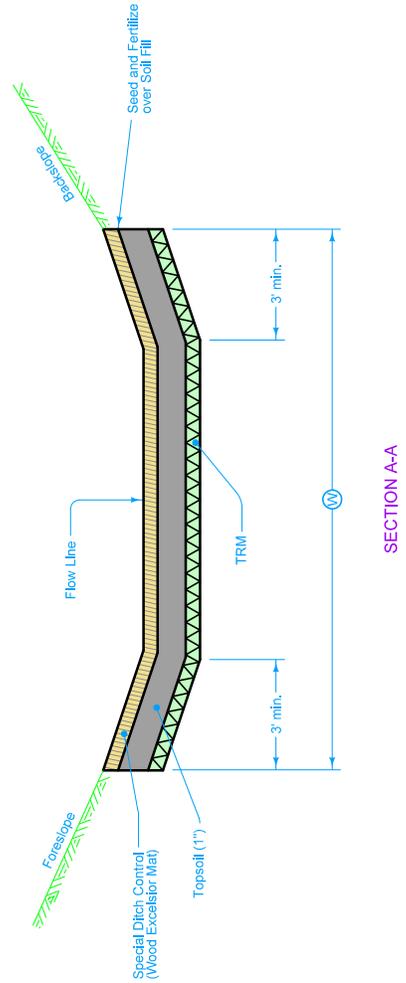
SPECIAL DITCH CONTROL MAT

Refer to EC-101 for Special Ditch Control (Wood Excelsior Mat).

- 1 Install anchor slot at the beginning (upstream end) of all mat installations.
- 2 Place staples alternately in rows approximately 24 inches apart. Approximately 30 staples required per square (100 sq. ft.) of each type of mat.
- 3 Stagger Junction Slots.



Possible Contract Items:
Turf Reinforcement Mat
Possible Tabulation:
100-22

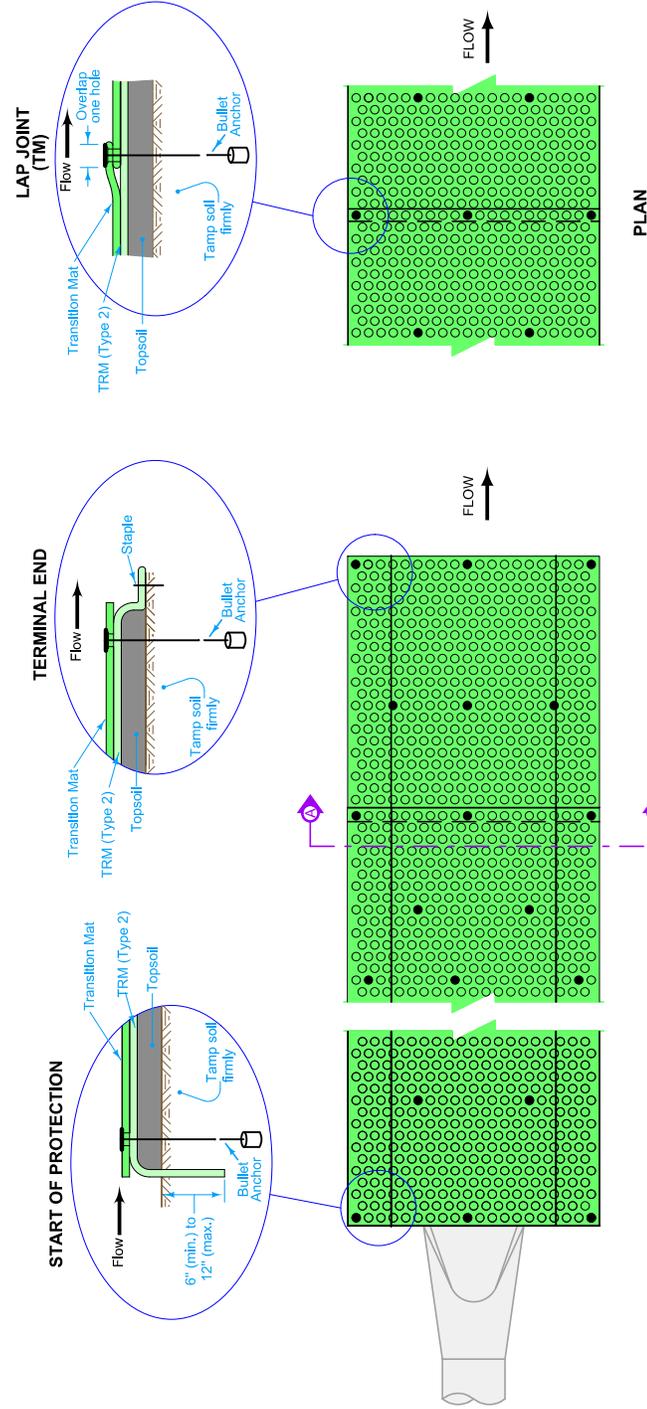


TRM
Wood Excelsior Mat

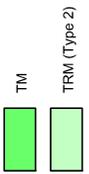
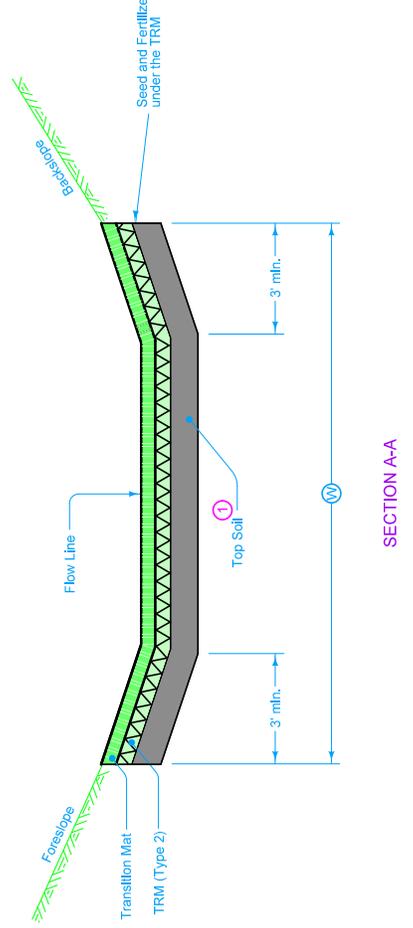
	REVISION	2	04-19-16
	EC-104		
STANDARD ROAD PLAN		SHEET 1 of 1	
REVISIONS: Revised to show placement of erosion control bedding at the end of the apron. Changed color in PLAN views to match wood excelsior mat.			
APPROVED BY DESIGN METHODS ENGINEER 			
TURF REINFORCEMENT MAT (TRM)			

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:
Turf Reinforcement Mat



	REVISION
	1 04-18-17
EC-105	
SHEET 1 of 1	
STANDARD ROAD PLAN	
REVISIONS: Remove reference to fab.	
APPROVED BY DESIGN METHODS ENGINEER	
TRANSITION MAT (TM)	

DESIGNER INFO

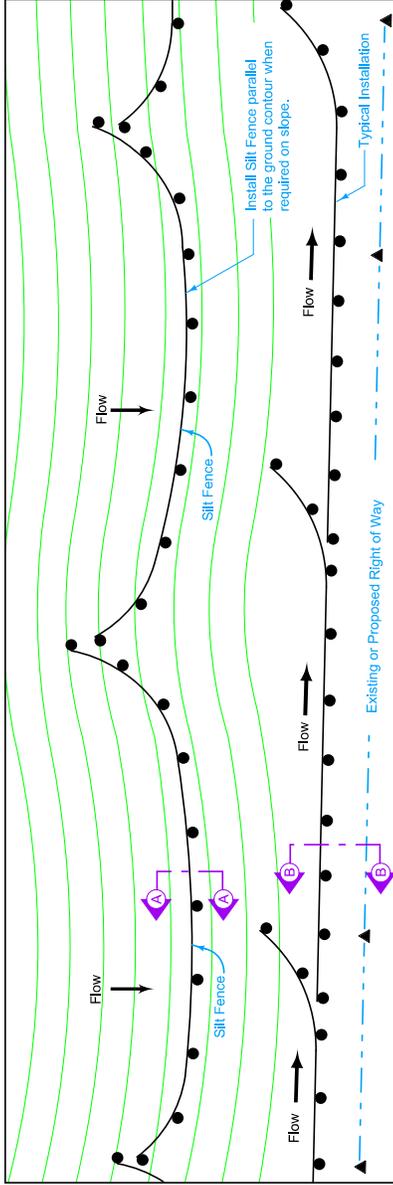
Install all silt fence using a silt fence machine. Use manual (trench) installation if physical conditions prohibit machine installation.

For machine installation, compact by driving over each side of silt fence at least two times with device exerting 60 p.s.i. or greater.

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

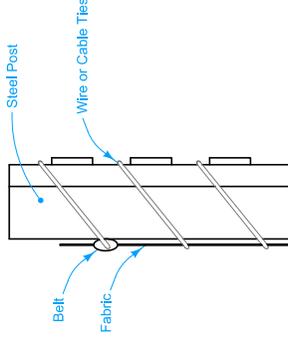
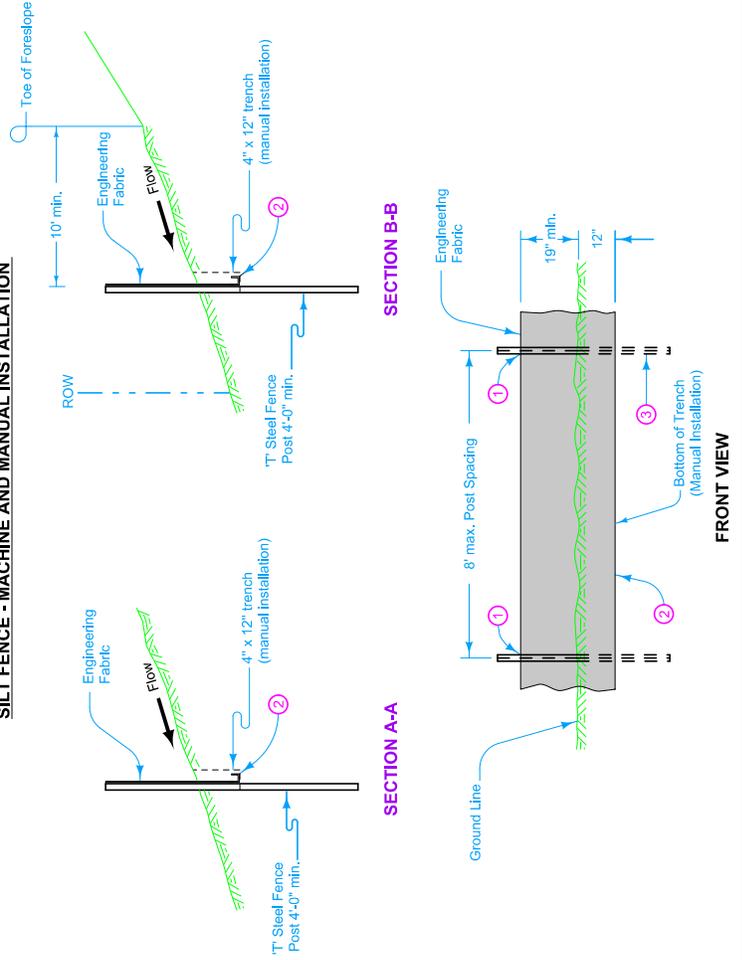
Place silt fence continuously up to a maximum length of 200 feet. For every segment of silt fence that is placed, flare up the slope the last 20 feet of the segment to contain runoff as shown.

- 1 Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire. See back view 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.
- 7 Refer to Tab. 100-17

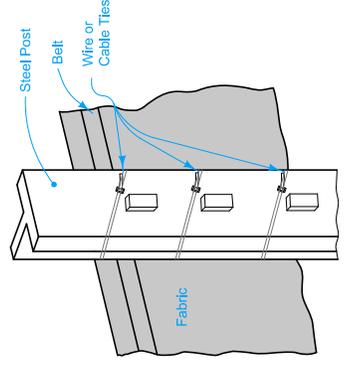


PLAN FOR SILT FENCE 7

SILT FENCE - MACHINE AND MANUAL INSTALLATION



PROFILE VIEW ATTACHMENT TO POST



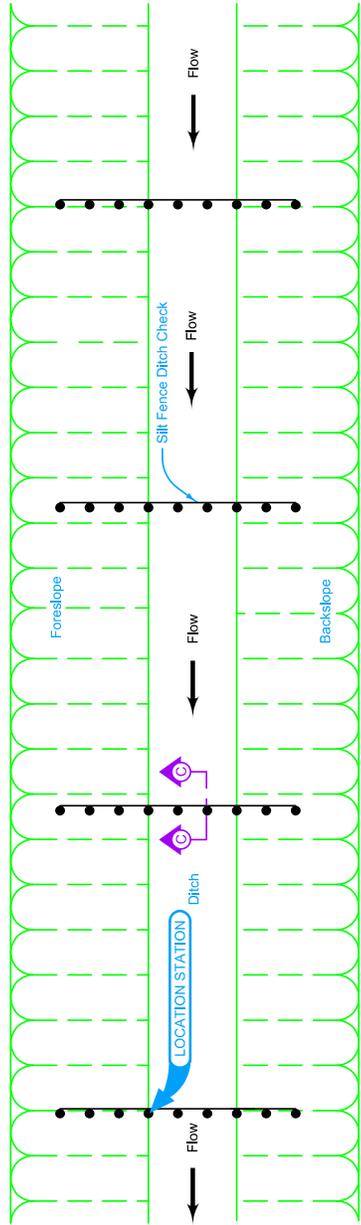
BACK VIEW ATTACHMENT TO POST



Contour Lines

- Possible Contract Items:
 Silt Fence
 Silt Fence for Ditch Checks
- Possible Tabulations:
 100-17
 100-18

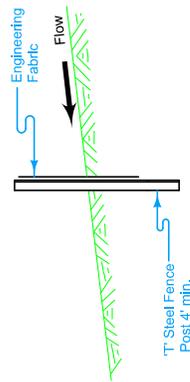
	REVISION 2 10-18-16
	EC-201 SHEET 1 of 3
STANDARD ROAD PLAN	
REVISIONS: Added TYPE 1, TYPE 2, and TYPE 3 to detail names on Pages 2 and 3. Modified note 5 to remove table. Added notes 6, 7, and 8. Added Designer Information.	
APPROVED BY DESIGN METHODS ENGINEER 	
SILT FENCE	



PLAN FOR DITCH CHECK (TYPE 1) (C)

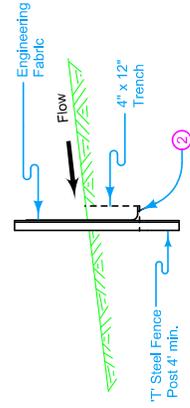
- 1 Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire. See attachment to post.
- 2 For manual installation only, fold engineering fabric along bottom of trench.
- 3 Embed all posts 28 inches below the ground line.
- 4 Locate posts at toe of foreslope and toe of backslope and space remaining posts equally.
- 5 Minimum end span (in feet) = 2 X Foreslope (H:V).
- 6 Minimum end span (in feet) = 2 X Backslope (H:V).
- 8 Refer to Tab. 100-18

DITCH CHECK - MACHINE INSTALLATION

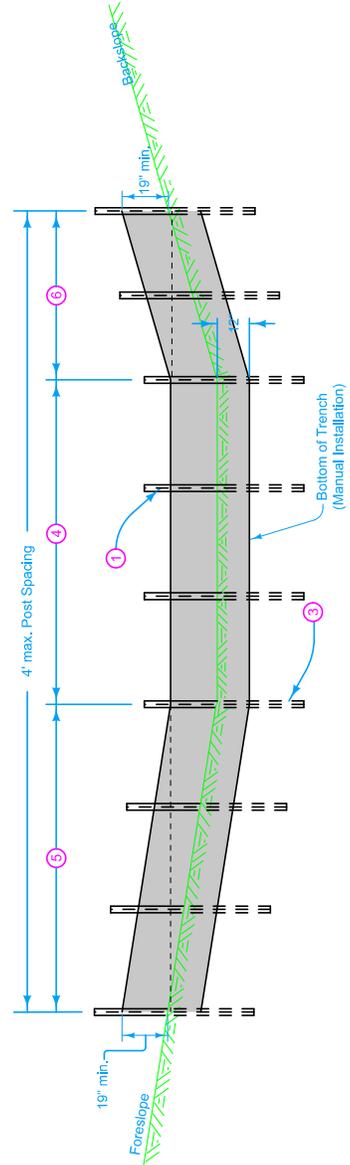


SECTION C-C

DITCH CHECK - MANUAL INSTALLATION



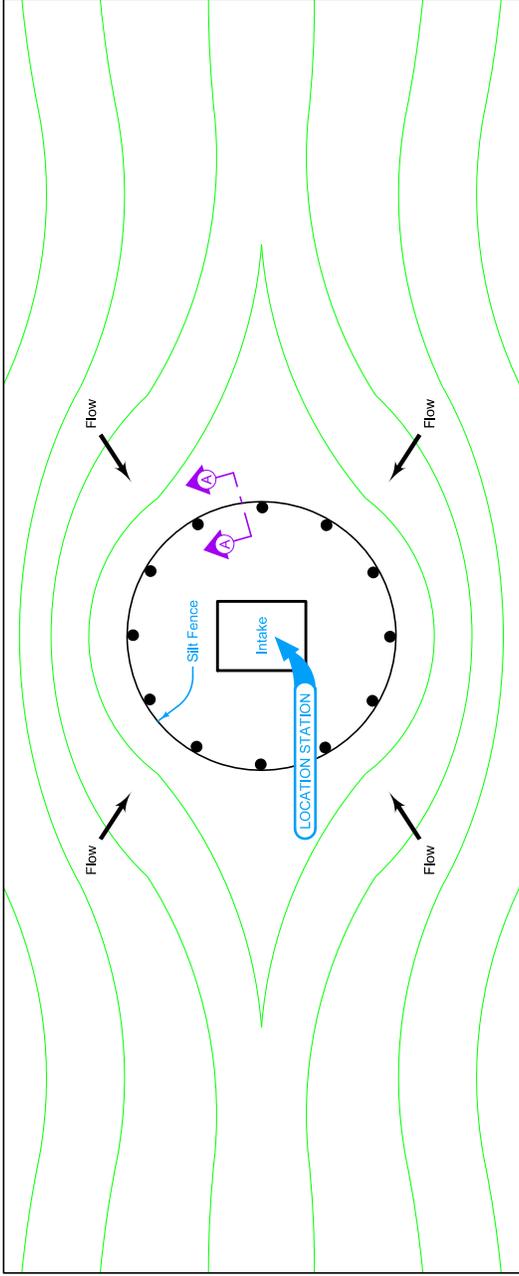
SECTION C-C



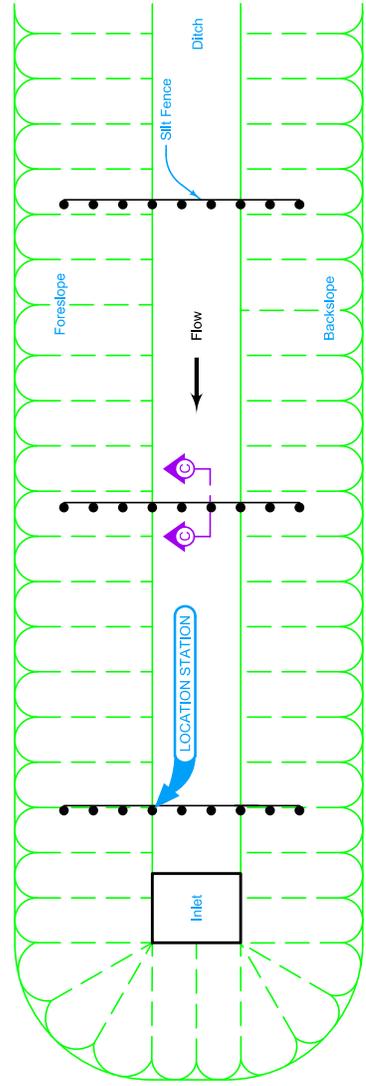
FRONT VIEW

IOWA DOT	REVISION
	2 10-18-16
STANDARD ROAD PLAN	
EC-201	
SHEET 2 of 3	
REVISIONS: Added TYPE 1 on Page 2, Added TYPES 2 and 3 on Page 3, Modified note 5 and added notes 6, 7, and 8, Removed foreslope table and replaced with table.	
 APPROVED BY DESIGN METHODS ENGINEER	

SILT FENCE



PLAN FOR SILT FENCE AT INTAKE (TYPE 2) ^(B)



PLAN FOR SILT FENCE DITCH CHECK AT INLET (TYPE 3) ^(B)

Contour Lines

^(B) Refer to Tab. 100-18

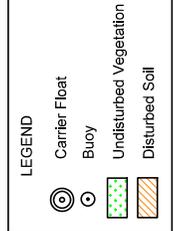
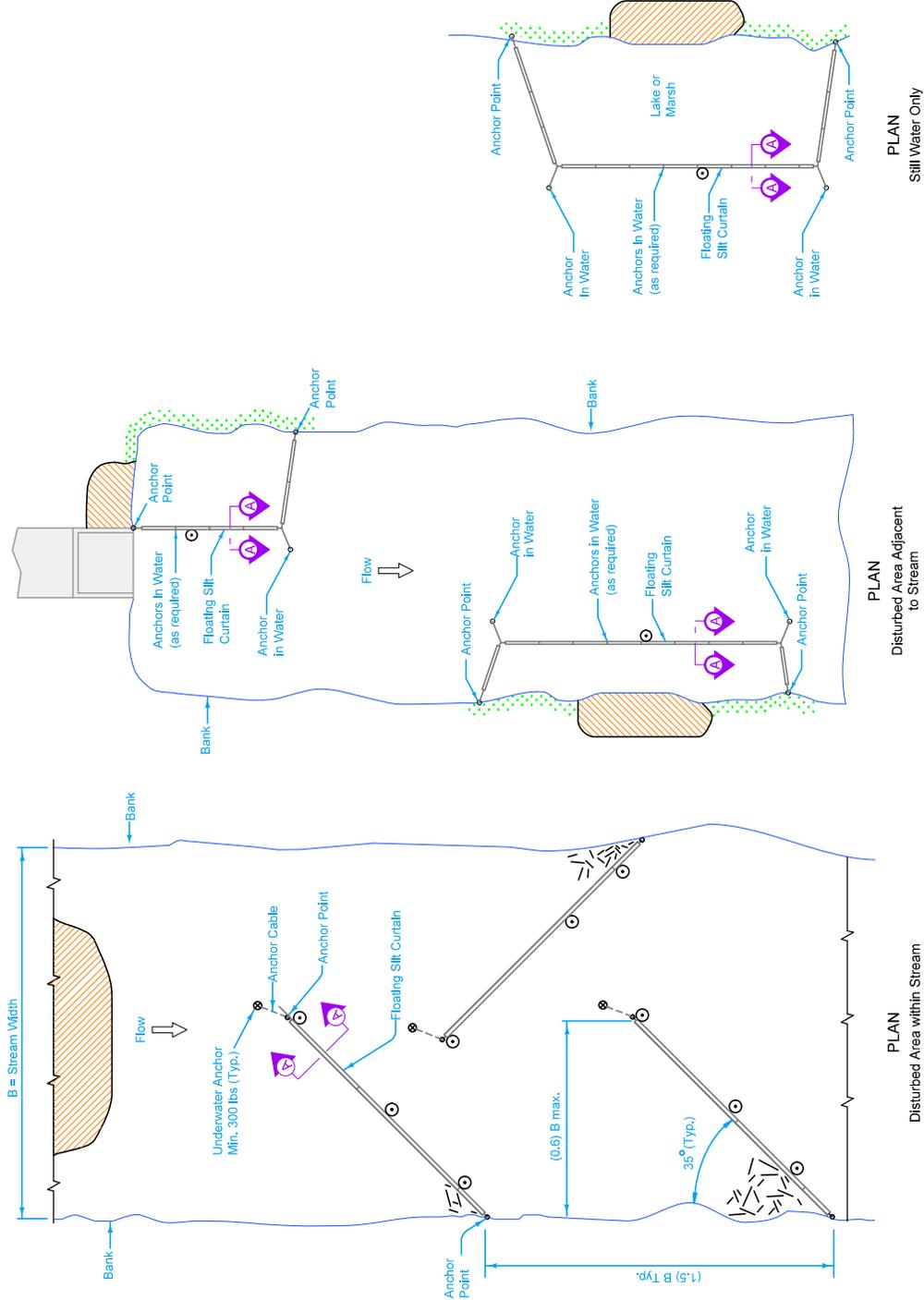
	REVISION
	2 10-18-16
STANDARD ROAD PLAN EC-201	
SHEET 3 of 3 <small>REVISIONS: Added TYPE 1 on Page 2, Added TYPES 2 and 3 on Page 3, Modified note 5 and added notes 6, 7, and 8, Removed foreslope table and replaced with table.</small>	
<small>APPROVED BY DESIGN METHODS ENGINEER</small> 	
SILT FENCE	

DESIGNER INFO

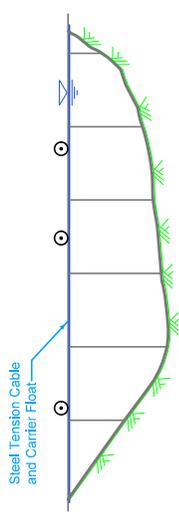
Keep silt curtain as close to work area as possible.
 Depth of curtain is the dimension of the curtain fabric extending below the flotation, i.e. hanging in the water.
 Install according to Hanging Installation unless specified otherwise.

Possible Tabulation:
 100-10

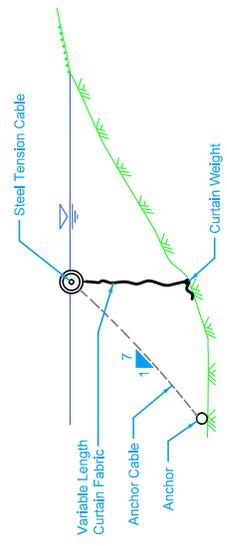
Possible Contract Items:
 Clean-out of Floating Silt Curtain (Containment)
 Floating Silt Curtain (Containment)
 Floating Silt Curtain (Hanging)
 Maintenance of Floating Silt Curtain



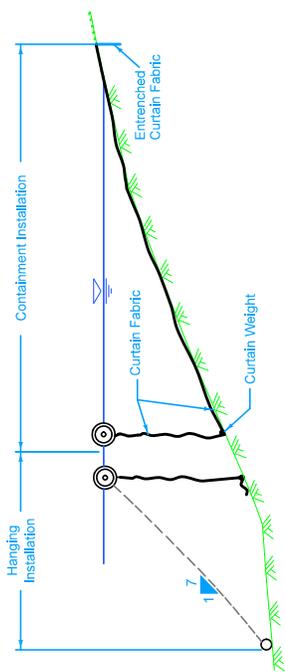
	REVISION	6	10-21-14
	STANDARD ROAD PLAN EC-202 SHEET 1 of 2		
REVISIONS: Removed 100' typical spacing between anchors on page 2. Added possible contract item. Removed sections of standard notes and detail note 1.			
APPROVED BY DESIGN METHODS ENGINEER 			
			FLOATING SILT CURTAIN



PROFILE



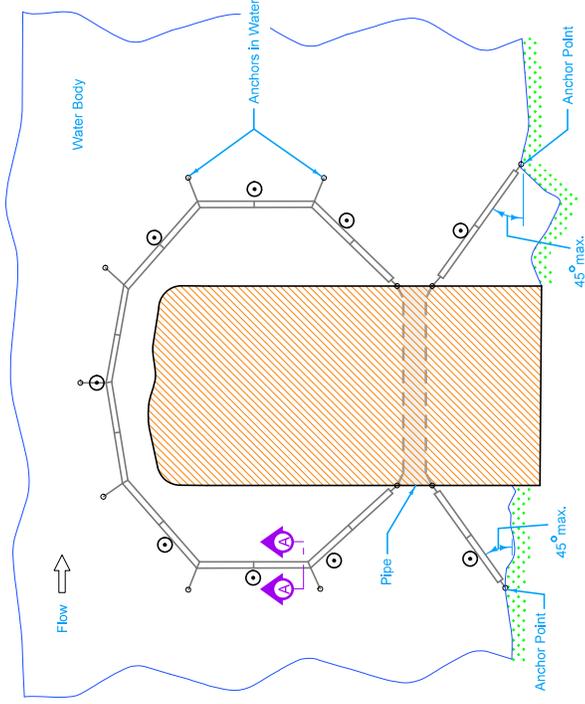
SECTION A-A
Hanging Installation



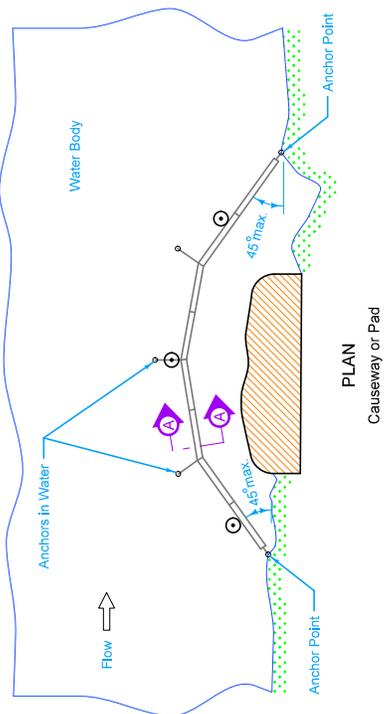
SECTION A-A
Containment Installation

LEGEND

	Carrier Float
	Buoys
	Undisturbed Vegetation
	Disturbed Soil
	Water Surface



PLAN
Stream Crossing or Causeway
(with pipe)

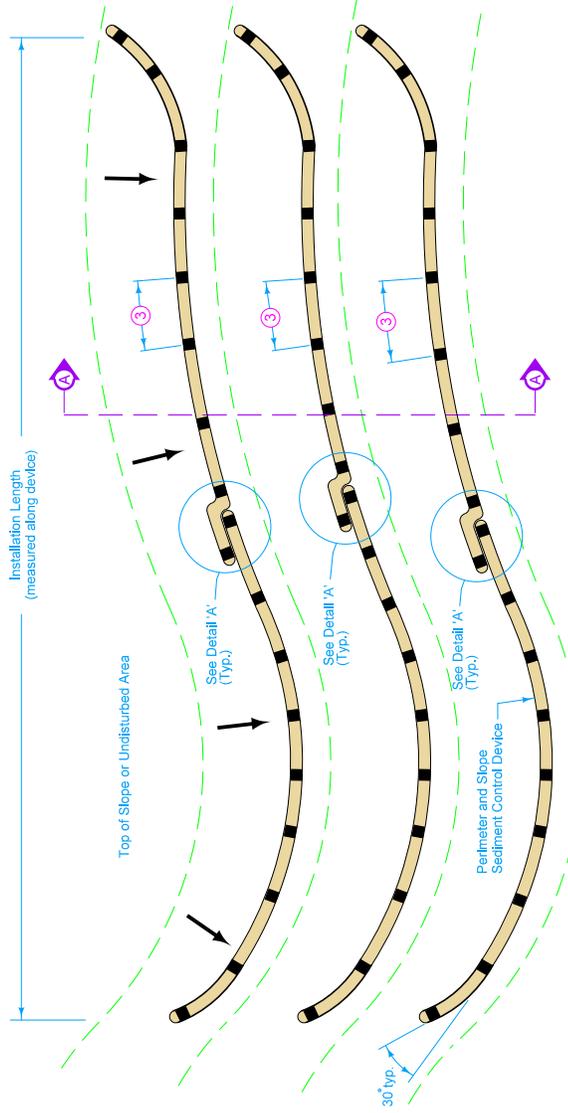


PLAN
Causeway or Pad

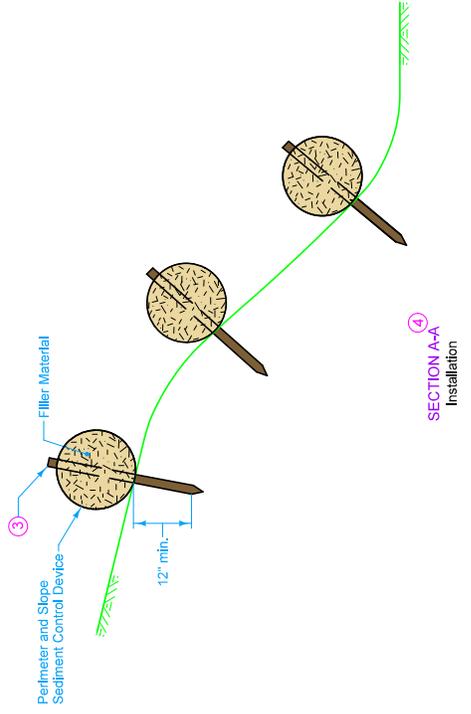
① When Containment Installation is specified, it will be in combination with a Hanging Installation that is paid for separately.

IOWA DOT	REVISION
	6 10-21-14
STANDARD ROAD PLAN	EC-202
	SHEET 2 of 2
REVISIONS: Removed 100' typical spacing between sections on page 2. Added possible contract item. Removed sections of standard notes and ditch note 1.	
APPROVED BY DESIGN METHODS ENGINEER	
<i>GB ZULON</i>	

FLOATING SILT CURTAIN



4 SLOPE PROTECTION



LEGEND	
	Contour Lines
	Flow
	Wood Stake
	4

- 3 Space stakes as follows:
 Filler Socks, dia. < 18"; 1" X 2" wood stakes at 10 foot maximum spacing.
 Filler Socks, dia. 18" or larger; 2" X 2" wood stakes at 10 foot maximum spacing.
 Wood Excelsior Logs and Straw Wattles; 1" X 1" wood stakes at 4 foot maximum spacing.
- 4 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.

	REVISION 2 04-19-16
	EC-204
STANDARD ROAD PLAN	
SHEET 2 of 3	
REVISIONS: Added Detail 'B' on Sheet 1. Added new drive note 2 on Sheet 1 and renumbered remaining circle notes. Added circle note 6 on Sheet 3.	
 APPROVED BY DESIGN METHODS ENGINEER	
PERIMETER AND SLOPE SEDIMENT CONTROL DEVICES	

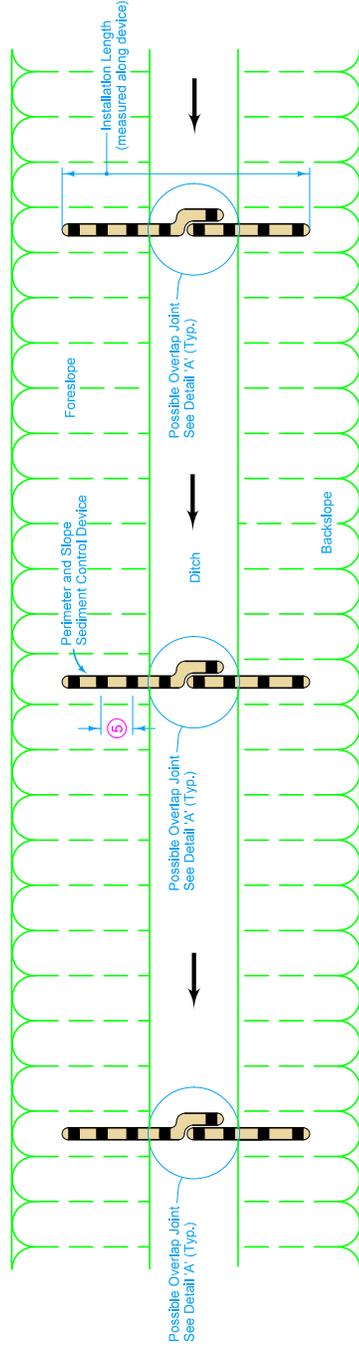
⑤ Space stakes as follows:

Filler Socks, dia. < 18": 1" X 2" wood stakes at 5 foot maximum spacing.

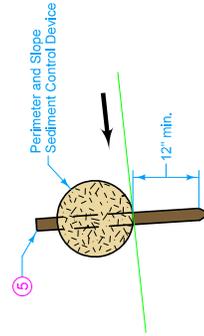
Filler Socks, dia. 18" or larger: 2" X 2" wood stakes at 5 foot maximum spacing.

Wood Excelsior and Straw Wattles: 1" X 1" wood stakes at 2 foot maximum spacing.

Install Ditch Protection perpendicular to ditch. Overlap joints per Detail 'A'.



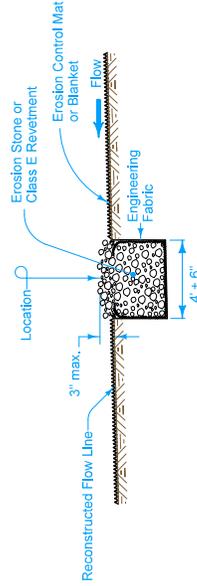
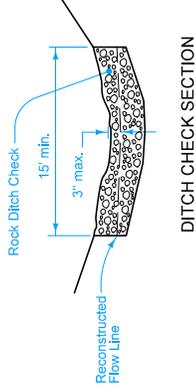
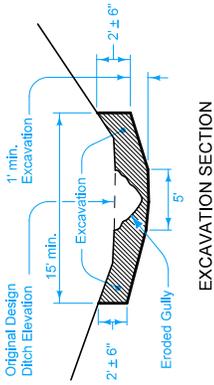
⑥ DITCH PROTECTION



INSTALLATION IN DITCH

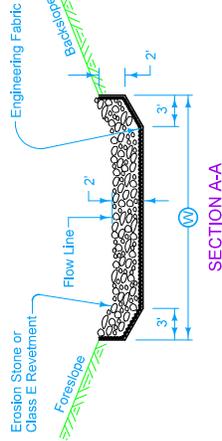
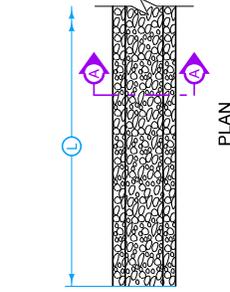
LEGEND	
	Contour Lines
	Flow
	Wood Stake
	⑤

	REVISION	04-19-16
	2	
STANDARD ROAD PLAN		EC-204
SHEET 3 of 3		REVISIONS: Added Detail 'B' on Sheet 1. Added new circle note 2 on Sheet 1 and renumbered remaining circle notes. Added circle note 6 on Sheet 3.
APPROVED BY DESIGN METHODS ENGINEER 		
PERIMETER AND SLOPE SEDIMENT CONTROL DEVICES		

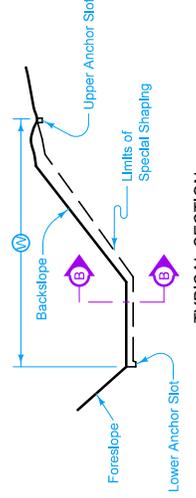
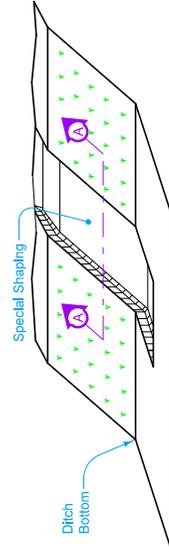


LONGITUDINAL SECTION AT CENTERLINE OF DITCH

**TYPE 1
(Rock Ditch Check)**



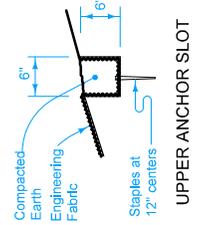
**TYPE 2
(Rock Ditch)**



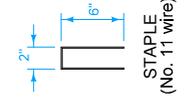
Possible Contract Items:
Erosion Stone
Class E Revetment
Engineering Fabric
Possible Tabulation:
100-23

IOWA DOT	REVISION	1	10-18-16
	STANDARD ROAD PLAN	EC-301	
REVISIONS: Modified details for Type 3 and Type 4 installations. Deleted old note 2 and renumbered old note 3 as note 2. Added Designer info button.		SHEET 1 of 2	
APPROVED BY DESIGN METHODS ENGINEER		 B. Zuluaga	

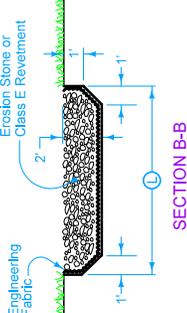
LOWER ANCHOR SLOT



**TYPE 3
(Rock Flume)**

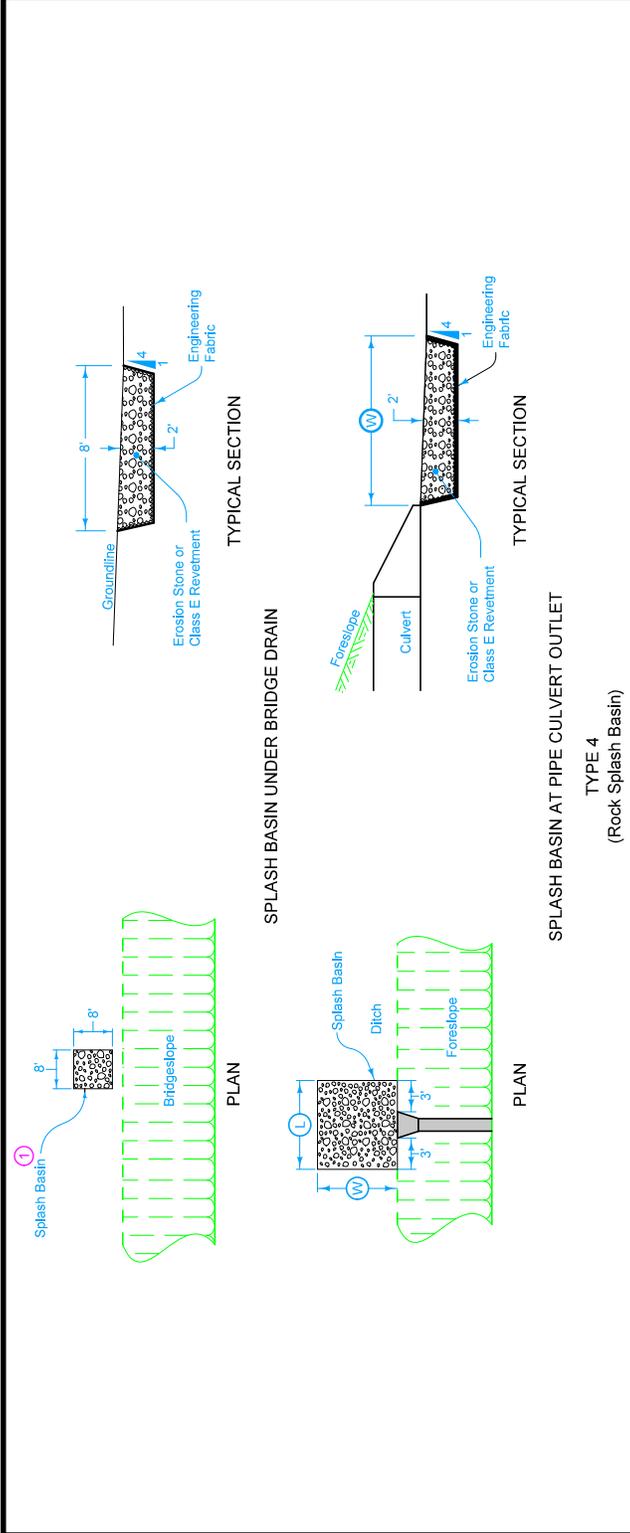


SECTION B-B

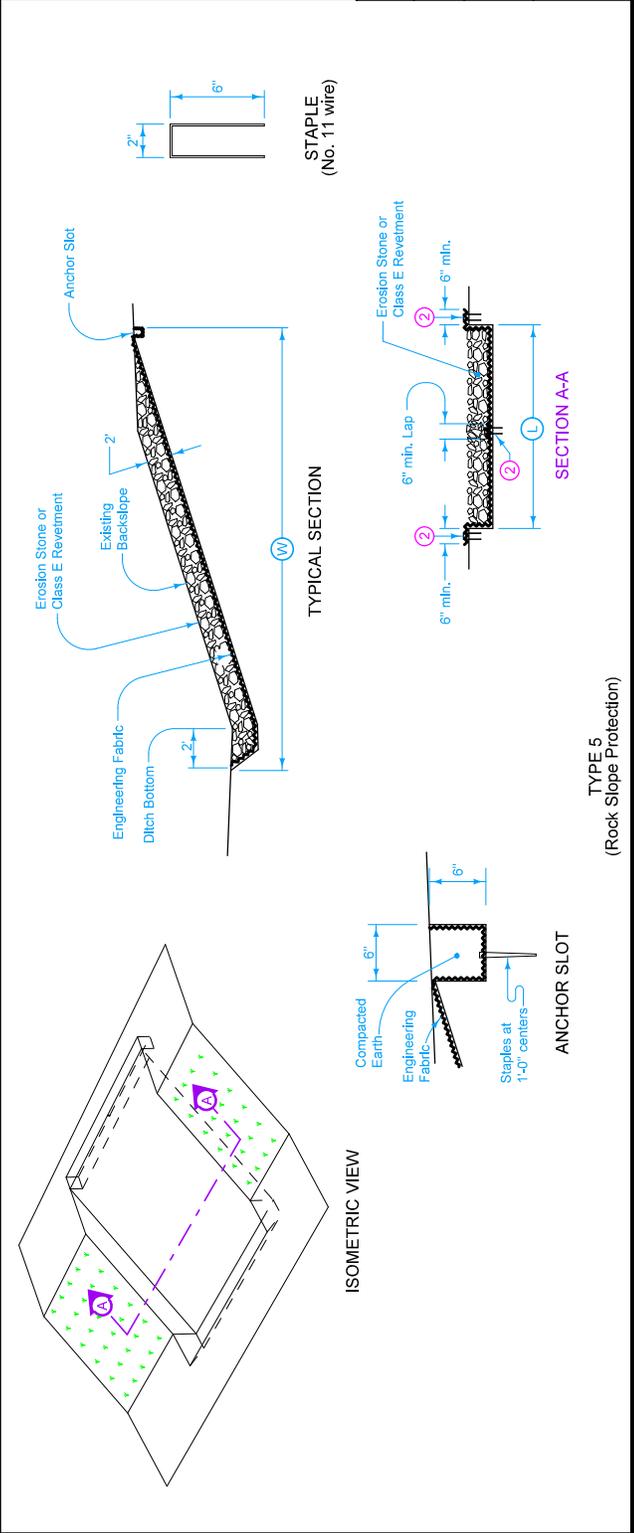


**ROCK EROSION CONTROL
(REC)**

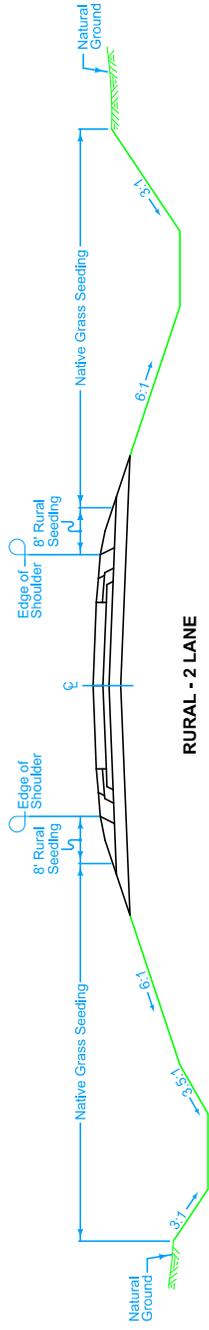
Class 10 excavation required to install Rock Erosion Control is incidental and will not be paid for separately.



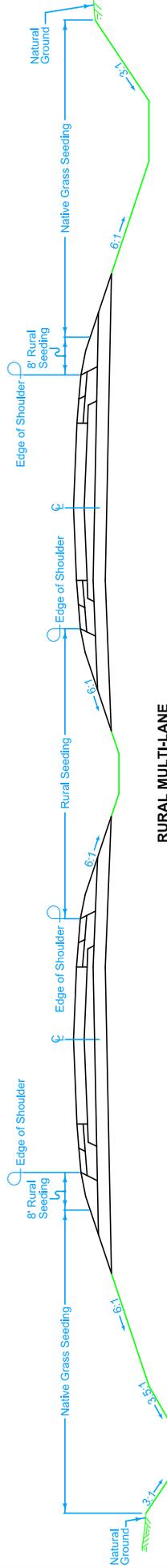
① Center splash basin directly under bridge drain.
 ② Staples at 12 inch centers.



	REVISION	10-18-16
	1	
STANDARD ROAD PLAN		
EC-301		
SHEET 2 of 2		
<small>REVISIONS: Modified details for Type 3 and Type 4 Installations. Deleted old note 2 and renumbered old note 3 as note 2. Added Designer info button.</small>		
<small>APPROVED BY DESIGN METHODS ENGINEER</small> 		
ROCK EROSION CONTROL (REC)		



RURAL - 2 LANE



RURAL MULTI-LANE



REVISION
New 04-21-15

EC-502

SHEET 1 of 1

STANDARD ROAD PLAN

REVISIONS: New.

APPROVED BY DESIGN METHODS ENGINEER

SEEDING IN RURAL AREAS

Standard Road Plans

EW Standards

EW-105: Reshaping Slopes and Ditches

EW-401: Temporary Stream Crossing, Causeway, or Equipment Pad

EW-402: Temporary Stream Diversion

EW-403: Temporary Erosion Control Measures

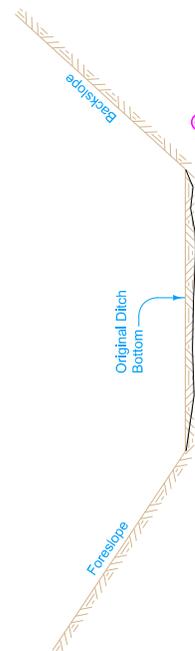


SLOPE RESHAPING

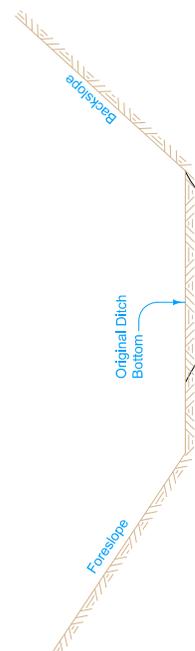


CLASS 10

RESHAPING SLOPES

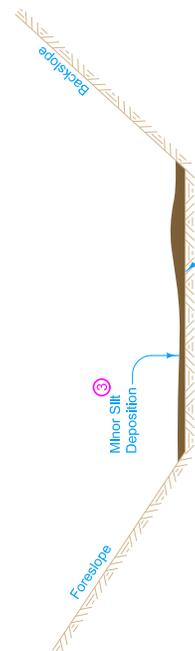


RESHAPING DITCHES



CLASS 10

DITCH RESHAPING

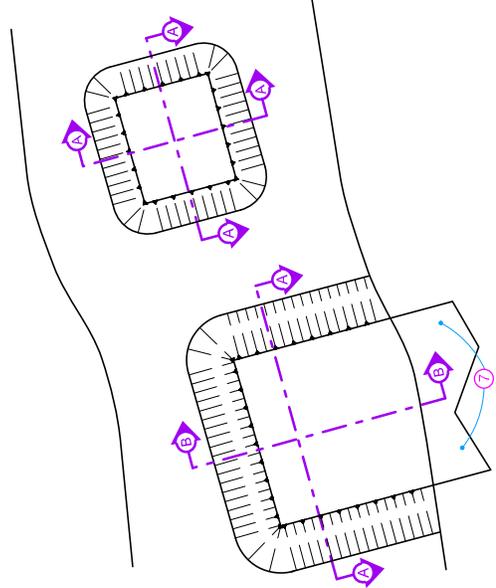


Minor slope and ditch reshaping resulting from normal seedbed preparation will not be paid for separately.

- ① Move material to or from areas immediately adjacent to slope to re-establish original slope template. Prepare slope according to Article 2601.03, B, 4, a of the Standard Specifications.
- ② Remove or place Class 10 material to re-establish original slope template. In areas of Class 10 placement, furnish topsoil and place according to Section 2105 of the Standard Specifications. Prepare slope according to Article 2601.03, B, 4, a of the Standard Specifications.
- ③ Move material to or from areas immediately adjacent in order to re-establish original ditch template. Prepare ditch according to Articles 2601.03, H, 1, a, b, and c of the Standard Specifications. Reshape ditch according to Section 2125 of the Standard Specifications.
- ④ Remove or place Class 10 material to re-establish original ditch template. In areas of Class 10 placement, furnish topsoil and place according to Section 2105 of the Standard Specifications. Prepare ditch according to Articles 2601.03, H, 1, a, b, and c of the Standard Specifications.

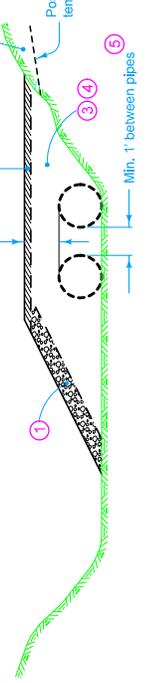
Possible Contract Items:
 Slope Reshaping
 Reshaping Ditches
 Class 10 Excavation
 Topsoil, Furnish and Spread

	REVISION
	New 04-21-15
EW-105	
STANDARD ROAD PLAN	
REVISIONS: New. SHEET 1 of 1	
 APPROVED BY DESIGN METHODS ENGINEER	
RESHAPING SLOPES AND DITCHES	

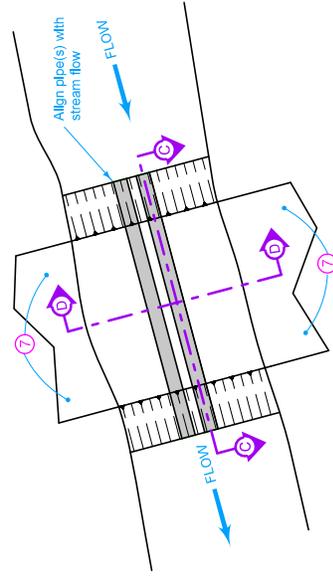


TYPICAL PLAN (CAUSEWAY OR EQUIPMENT PAD) (5)

Min. cover of 1' or $\frac{1}{2}$ the diameter of the pipe, whichever is greater.

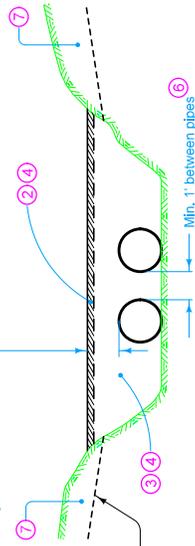


SECTION B-B (CAUSEWAY) (5)

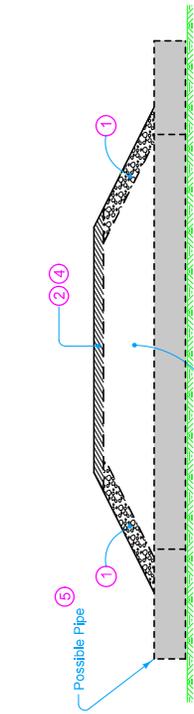


TYPICAL PLAN (STREAM CROSSING) (6)

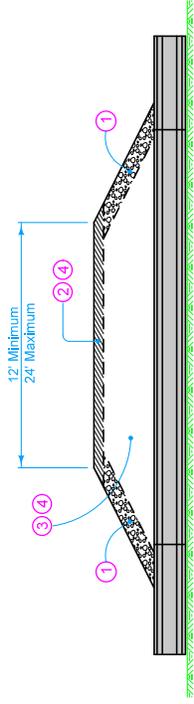
Min. cover of 1' or $\frac{1}{2}$ the diameter of the pipe, whichever is greater.



SECTION D-D (STREAM CROSSING) (6)



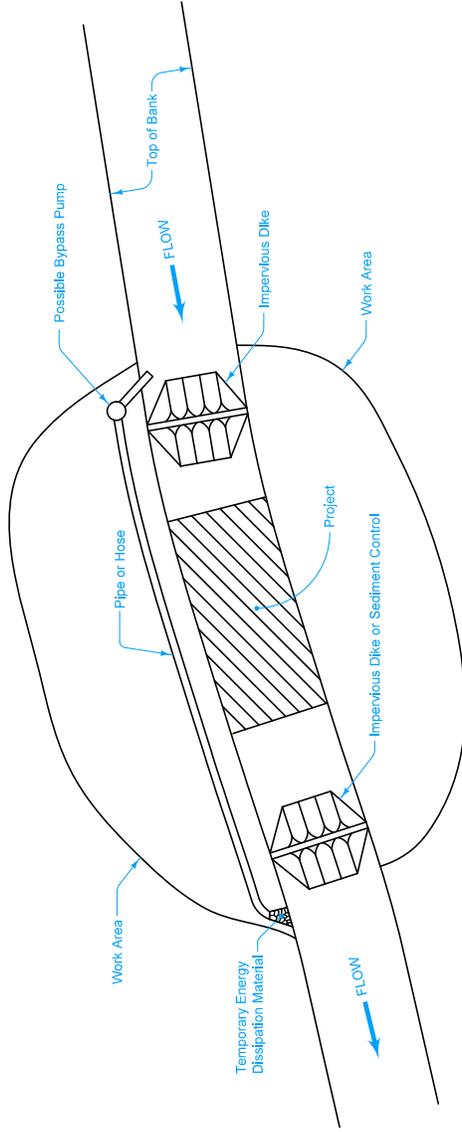
SECTION A-A (5)



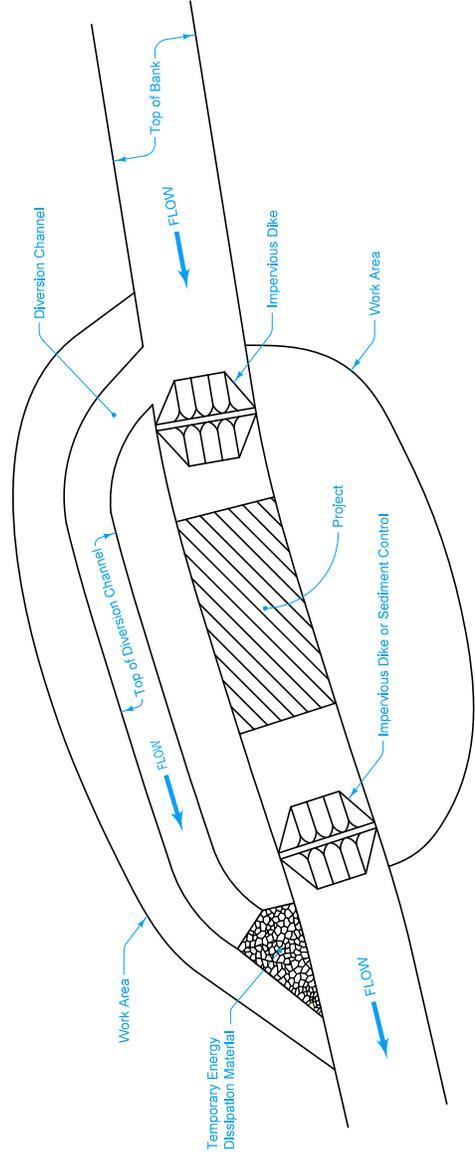
SECTION C-C (6)

- 1 Minimum 1 foot of Class D revetment, Class E revetment, or broken concrete meeting the requirements of Section 4130 of the Standard Specifications.
- 2 Possible choke layer for construction traffic. Use any combination of erosion stone, granular backfill, special backfill (except with reclaimed HMA), granular surfacing material, or granular soils of AASHTO classification A-1 or A-2 with less than 5% fines passing the #200 sieve.
- 3 Use clean material with less than 5% fines passing the #200 sieve. Acceptable materials include revetment and granular materials.
- 4 When dredging is allowed by a permit, use dredged material containing 10% or less passing the #200 sieve. Prior to beginning construction according to EW-401, install erosion control measures according to EC-202. Leave these measures in place and maintain until temporary E/W-401 materials have been completely removed. Installation, maintenance, and removal of these erosion control measures is incidental and will not be paid for separately.
- 5 Pipe required if structure spans more than half the distance between banks. Contractor determines size and number of pipe(s) unless specified otherwise in the contract documents.
- 6 Pipe required. Contractor determines size and number of pipe(s) unless specified otherwise in the contract documents.
- 7 When material needs to be cut from the bank to provide for access to construct and use a temporary stream structure, move this material to an upland location.

	REVISION	2	10-20-15
	EW-401		
STANDARD ROAD PLAN		SHEET 1 of 1	
REVISIONS: Corrected type in note 4. Updated the DOT logo.			
APPROVED BY DESIGN METHODS ENGINEER 			
TEMPORARY STREAM CROSSING, CAUSEWAY, OR EQUIPMENT PAD			



PIPE OR HOSE



DIVERSION CHANNEL

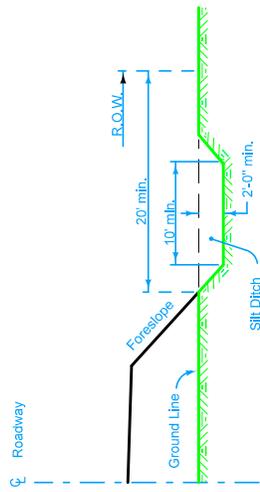
Possible Contract Items:

- Temporary Stream Diversion
- Silt Fence
- Removal of Silt Fence or Silt Fence for Ditch Check
- Perimeter and Slope Sediment Control Device

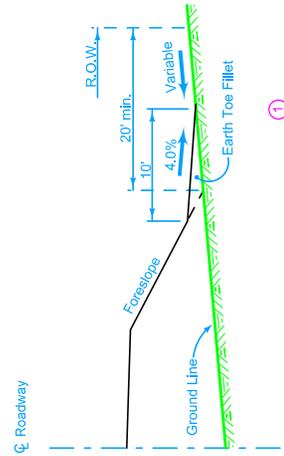
Possible Tabulations:

- 100-26
- 100-17

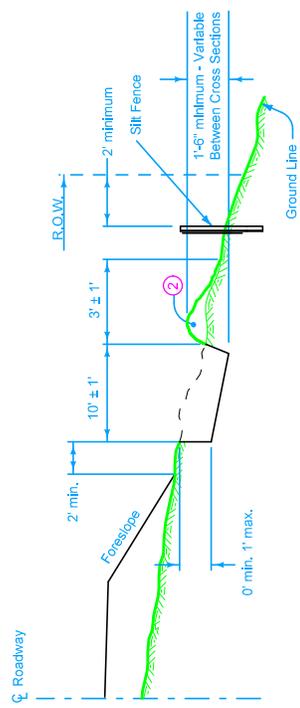
	REVISION	10-20-15
	1	
EW-402		
STANDARD ROAD PLAN		
SHEET 1 of 1		
REVISIONS: Replaced the DOT logo in the title block with the new version.		
 APPROVED BY DESIGN METHODS ENGINEER		
TEMPORARY STREAM DIVERSION		



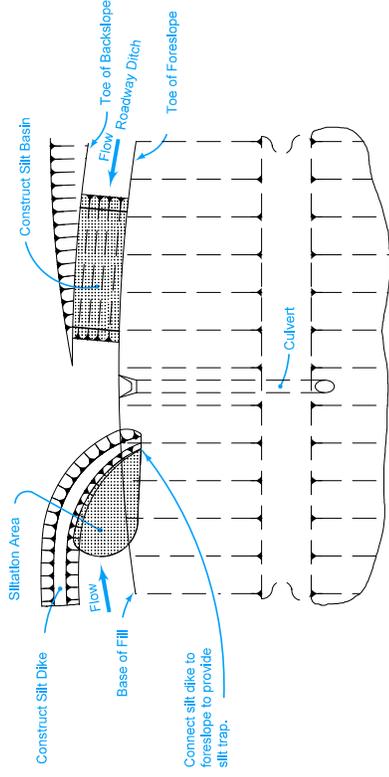
SILT DITCH



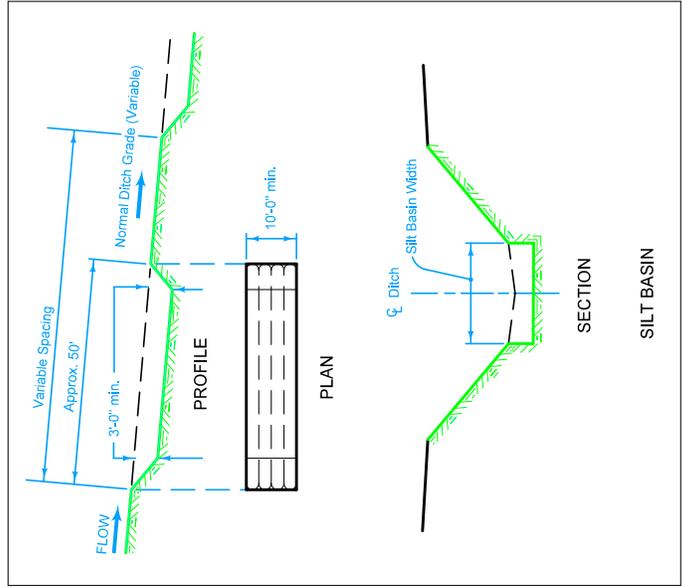
TOE FILLET



SILT DIKE



TYPICAL PLAN WITH PERMANENT CULVERT INSTALLATION



SILT BASIN

Obtain the Engineer's approval for installation locations.

- ① Construct an earth fillet at the toe of the roadway foreslope for areas where a roadway ditch, silt ditch, or silt dike is not provided. This Toe Fillet is incidental to "Roadway and Borrow Excavation".
- ② Windrow of excavated and compacted silt material or deposited and compacted earth.

Possible Contract Items:

- Silt Ditch
- Silt DiKE
- Silt Basin

Possible Tabulations:

- 100-13
- 100-14
- 100-15

	REVISION
	2 10-18-16
EW-403	
STANDARD ROAD PLAN	
REVISIONS: Modified SILT DIKE detail.	
SHEET 1 of 1	
APPROVED BY DESIGN METHODS ENGINEER	
TEMPORARY EROSION CONTROL MEASURES	

**STD. ROAD
PLANS - DR**

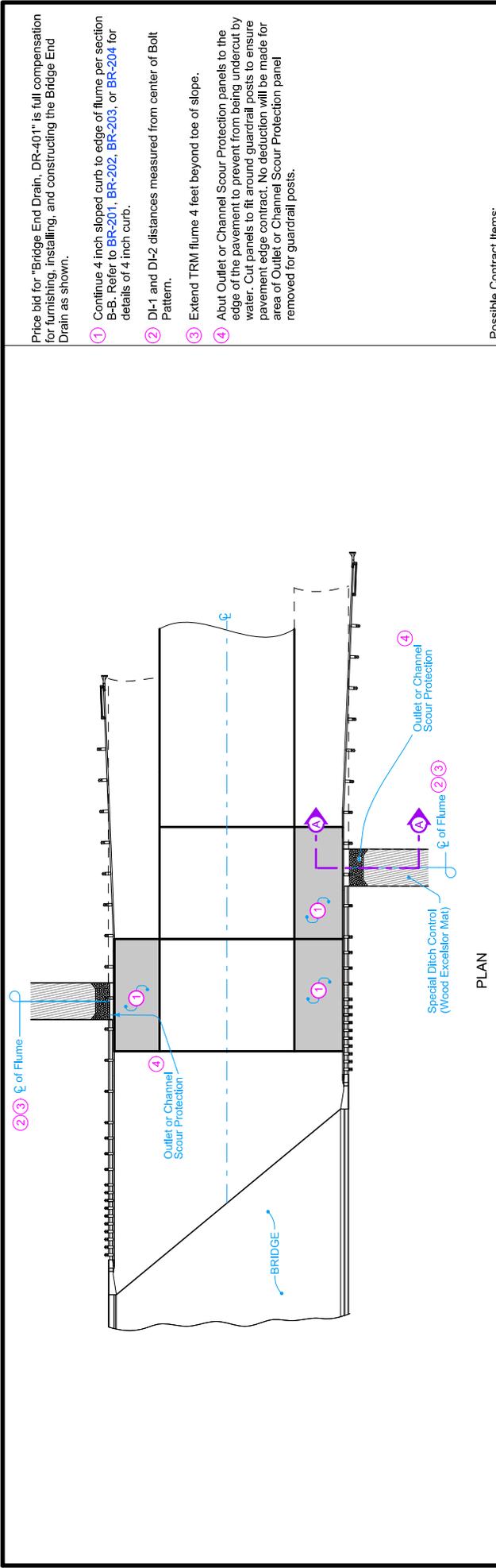
Standard Road Plans

DR Standards

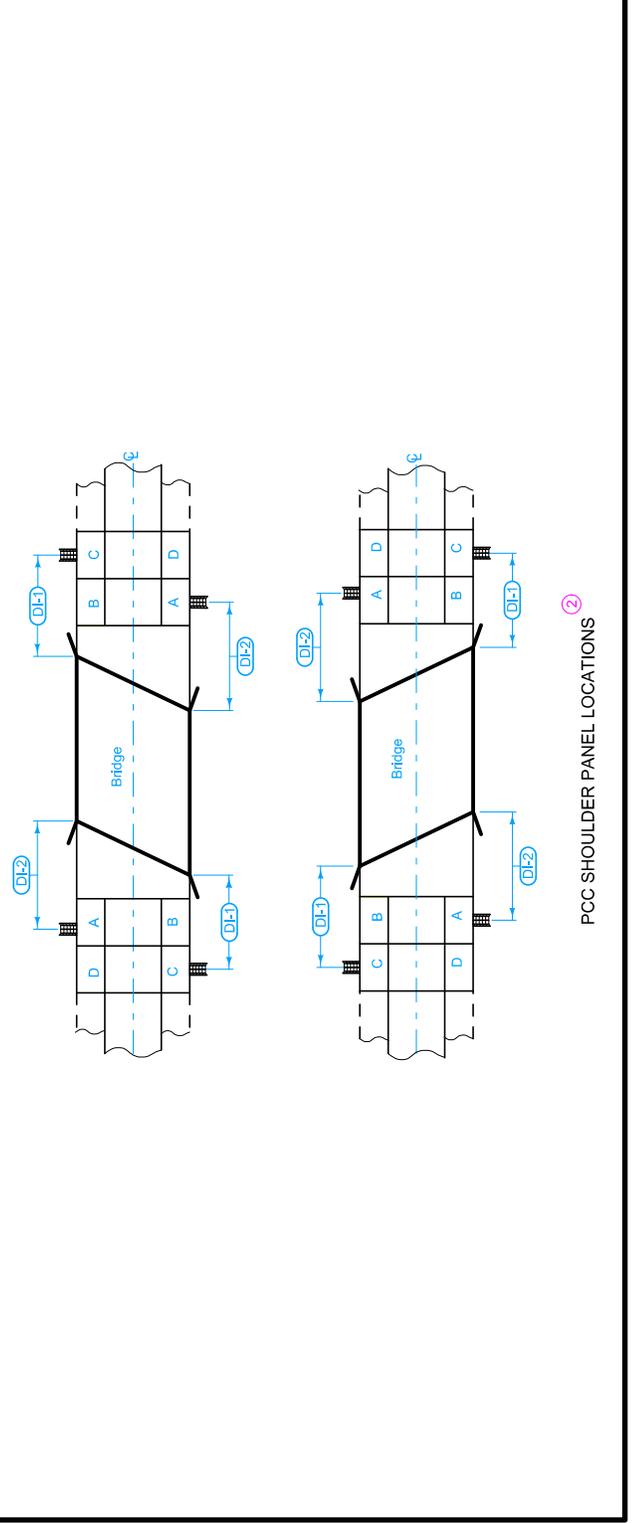
DR-401: Scour Protection for Bridge End Drain

DR-402: Rock Flume for Bridge End Drain

DESIGNER INFO

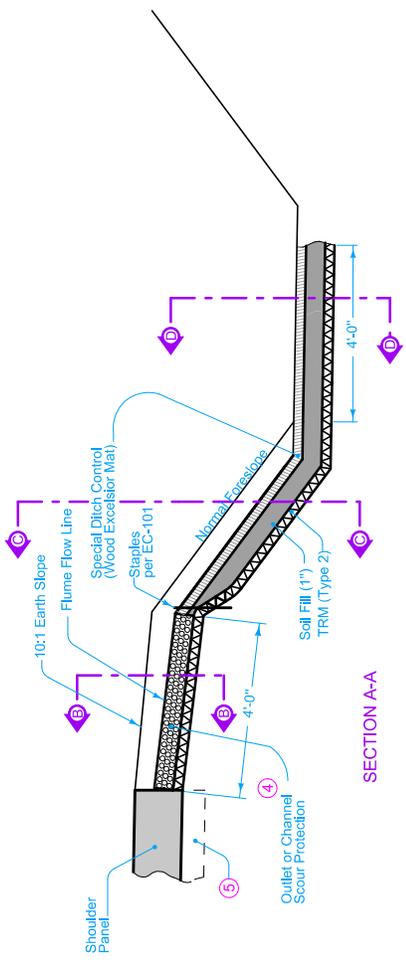


- 1 Continue 4 inch sloped curb to edge of flume per section B-B. Refer to BR-201, BR-202, BR-203, or BR-204 for details of 4 inch curb.
 - 2 DI-1 and DI-2 distances measured from center of Bolt Pattern.
 - 3 Extend TRM flume 4 feet beyond toe of slope.
 - 4 Abut Outlet or Channel Scour Protection panels to the edge of the pavement to prevent from being undercut by water. Cut panels to fit around guardrail posts to ensure pavement edge contract. No deduction will be made for area of Outlet or Channel Scour Protection panel removed for guardrail posts.
- Possible Contract Items:
 Bridge End Drain, DR-401
 Paved Shoulder, Portland Cement Concrete (Paved Shoulder Panel for Bridge End Drain)
- Incidental to Paved Shoulder:
 Modified Subbase
 Polymer Grid
- Incidental to Bridge End Drain:
 Transition Mat
 Seeding and Fertilizing
 Soil Fill
 Special Ditch Control (Wood Excelsior Mat)
 Turf Reinforced Mat, Type 2
 Watering for Sod, Special Ditch Control, or Slope Protection
 Mobilization for Watering
- Possible Tabulation:
 104-8A

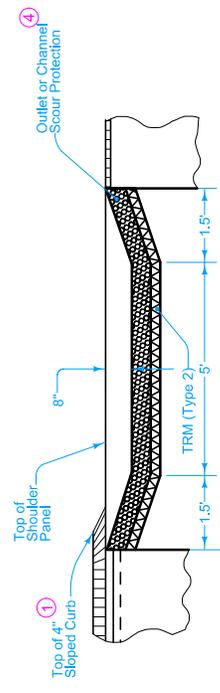


IOWA DOT	REVISION
	1 4-19-16
STANDARD ROAD PLAN	
DR-401	
SHEET 1 of 2	
REVISIONS: Modified note 2 to eliminate requirement to place center of flume a minimum of 9 feet from a joint. Changed Section B-B from V shape to flume shape.	
APPROVED BY DESIGN METHODS ENGINEER	
 B. ZULON DESIGN METHODS ENGINEER	
SCOUR PROTECTION FOR BRIDGE END DRAIN	

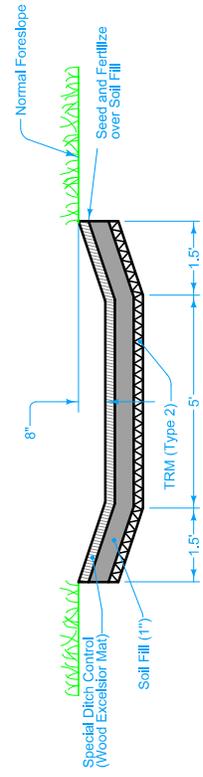
- ① Continue 4 inch sloped curb to edge of flume per section B-B. Refer to BR-201, BR-202, BR-203, or BR-204 for details of 4 inch curb.
- ④ Abut Outlet or Channel Scour Protection panels to the edge of the pavement to prevent from being undercut by water. Cut panels to fit around guardrail posts to ensure pavement edge contact. No deduction will be made for area of Outlet or Channel Scour Protection panel removed for guardrail posts.
- ⑤ Install modified subbase and polymer grid under PCC shoulder panels as shown in Section A-A on BR-201, BR-202, BR-203, or BR-204.
- ⑥ Transition the flume flow line depth from 3 inches at the downstream edge of Outlet or Channel Scour Protection to 8 inches with an approximate transition rate of 1 inch vertical per 1 foot horizontal.
- ⑦ Transition the flume flow line depth from 8 inches at the toe of slope to 0 inches with an approximate transition rate of 2 inches vertical per 1 foot horizontal.



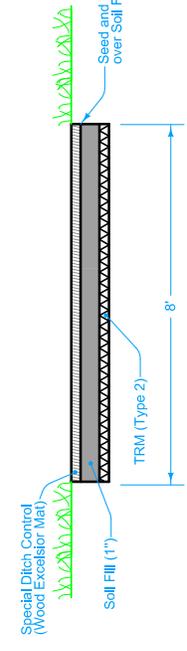
SECTION A-A



SECTION B-B



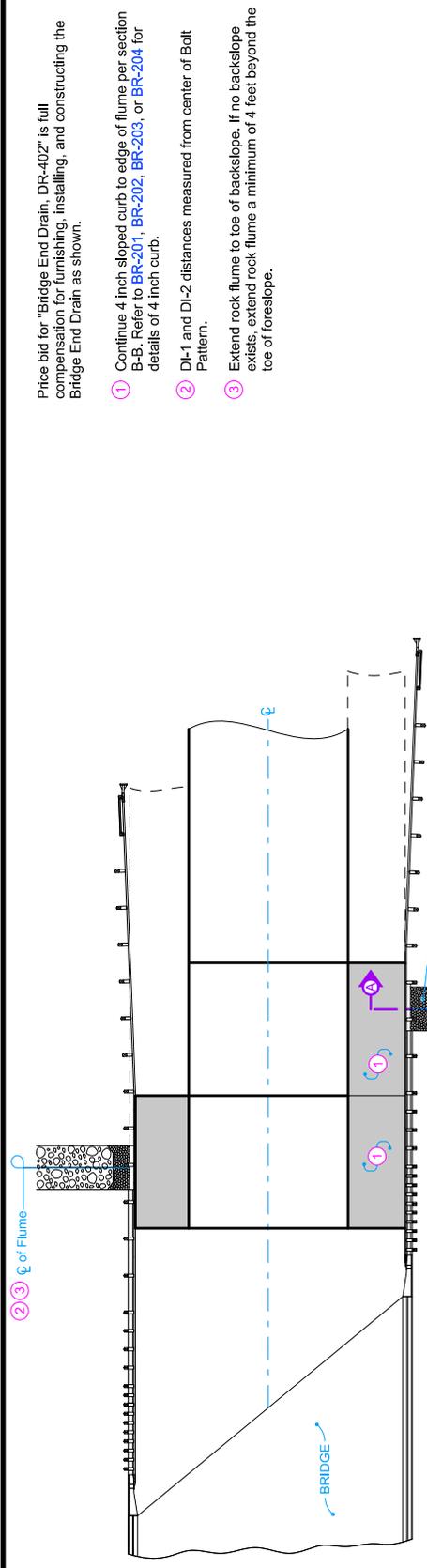
SECTION C-C



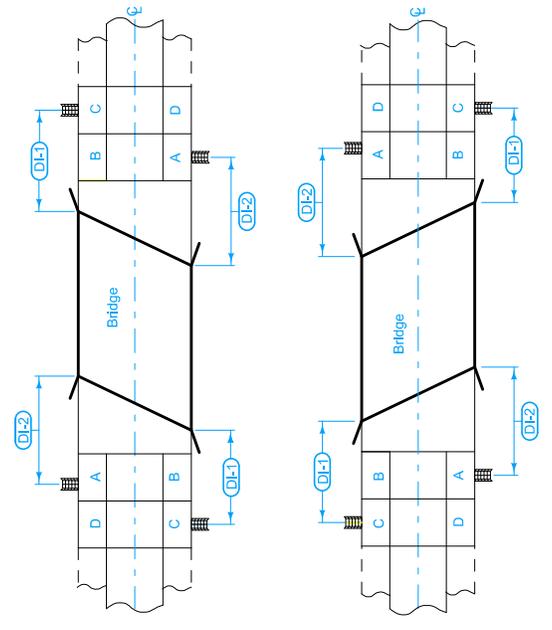
SECTION D-D

IOWA DOT	REVISION
	1 4-19-16
DR-401	
SHEET 2 of 2	
STANDARD ROAD PLAN	
REVISIONS: Modified note 2 to eliminate requirement to place center of flume a minimum of 9 feet from a joint. Changed Section B-B from V shape to flume shape.	
APPROVED BY DESIGN METHODS ENGINEER	
SCOUR PROTECTION FOR BRIDGE END DRAIN	

DESIGNER INFO



PLAN



PCC SHOULDER PANEL LOCATIONS 2

Price bid for "Bridge End Drain, DR-402" is full compensation for furnishing, installing, and constructing the Bridge End Drain as shown.

- 1 Continue 4 inch sloped curb to edge of flume per section B-B. Refer to BR-201, BR-202, BR-203, or BR-204 for details of 4 inch curb.
- 2 DJ-1 and DJ-2 distances measured from center of Bolt Pattern.
- 3 Extend rock flume to toe of backslope. If no backslope exists, extend rock flume a minimum of 4 feet beyond the toe of foreslope.

Possible Contract Items:
 Paved Shoulder, Portland Cement Concrete (Paved Shoulder Panel for Bridge-End Drain)
 Bridge End Drain, DR-402

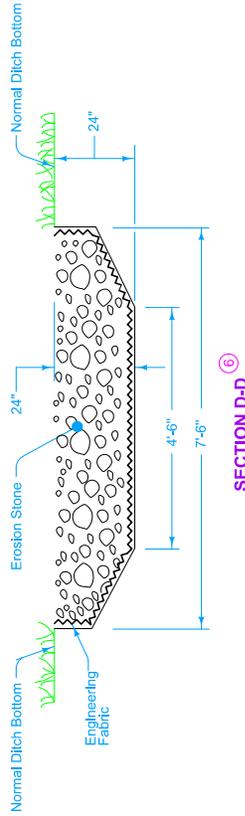
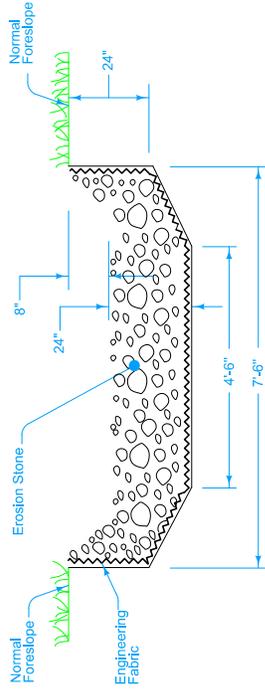
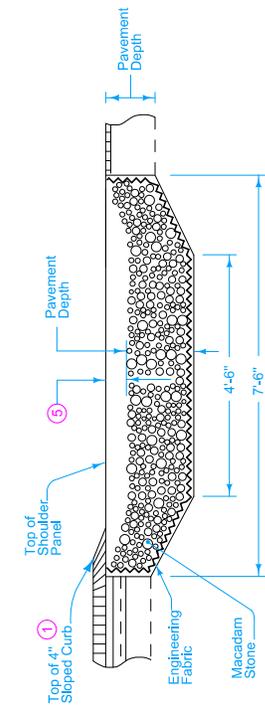
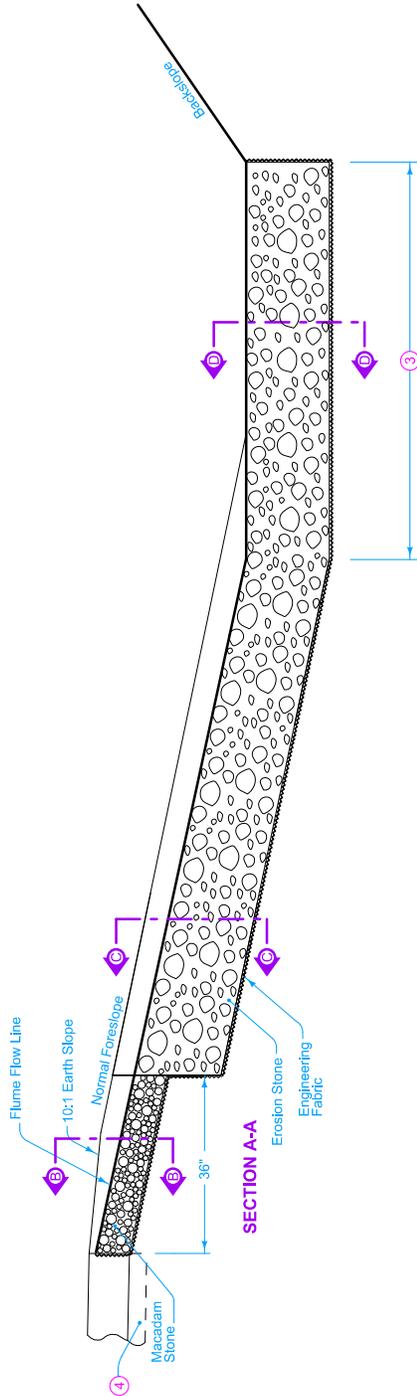
Incidental to Paved Shoulder:
 Modified Subbase
 Polymer Grid

Incidental to Bridge End Drain:
 Macadam Stone Base Material
 Erosion Stone
 Engineering Fabric
 Excavation, hauling, and disposing of material

Possible Tabulation:
 104-8A

	REVISION	2	10-18-16
	DR-402		
STANDARD ROAD PLAN			
REVISIONS: Modified Section A-A, Added Section D-B, Renumbered notes 2 through 5, Added note 6.			
APPROVED BY DESIGN METHODS ENGINEER 			
ROCK FLUME FOR BRIDGE END DRAIN			

- ① Continue 4 inch sloped curb to edge of flume per section B-B. Refer to BR-201, BR-202, BR-203, or BR-204 for details of 4 inch curb.
- ③ Extend flume to toe of backslope. If no backslope exists, extend rock flume a minimum of 4 feet beyond the toe of foreslope.
- ④ Install modified subbase and polymer grid under PCC shoulder panels as shown in Section A-A on BR-201, BR-202, or BR-203, or BR-204.
- ⑤ Transitions from 2 inches at edge of pavement to 8 inches within 3 feet.
- ⑥ Transition the flume flow line depth from 8 inches at the toe of slope to 0 inches with an approximate transition rate of 2 inches per 1 foot horizontal.



REVISION 2 10-18-16
DR-402
 STANDARD ROAD PLAN

SHEET 2 of 2
 REVISIONS: Modified Section A-A, Added Section D-D, Renumbered notes 2 through 5, Added note 6.

APPROVED BY DESIGN METHODS ENGINEER
 B. Z. L. U. O. N. A. M. E. T. H. S. E. N. G. I. N. E. E. R.

**ROCK FLUME FOR
 BRIDGE END DRAIN**

**DESIGN & TAB.
FORMS**

Design and Tabulation Forms

100-10: Floating Silt Curtains

100-13: Tabulation of Silt Ditches

100-14: Silt Basins

100-15: Tabulation of Silt Dikes

100-16: Tabulation of Intercepting Ditches

100-17: Tabulation of Silt Fences

100-18: Silt Fences for Ditch Checks

100-19: Perimeter and Slope Sediment Control Devices

100-22: Rolled Erosion Control

100-23: Rock Erosion Control

100-32: Rock Check Dam

100-33: Temporary Sediment Control Basin

100-34: Stormwater Drainage Basin

100-35: Summary of Stormwater Storage

100-36: Open-Throat Curb Intake Sediment Filter

100-37: Grate Intake Sediment Filter Bag

100-10
10-21-14

FLOATING SILT CURTAINS

Refer to EC-202

Station	Hanging	Containment	Clean-out (Containment)	Maintenance of Floating Silt Curtain	Remarks
	LF	LF	LF	LF	

SILT DITCHES				100-13
Refer to EM-403				10-15-13
Station to Station	Side	LF	Remarks	

100-15
10-15-13

SILT DIKES

Refer to EW-403

Location		Length	Remarks
Station to Station	Side	LF	

100-16
10-19-10

TABULATION OF INTERCEPTING DITCHES

Location		Length LF	Remarks
Station to Station	Side		

100-17
04-20-10

TABLATION OF SILT FENCES

Refer to EC-201

Location		Length LF	Remarks
Begin Station	End Station		

100-19
04-19-16

PERIMETER AND SLOPE SEDIMENT CONTROL DEVICE

Possible Standards: EC-204

Location		Length of Installation			Remarks	
Begin Station	End Station	Side	9 inch Dia	12 inch Dia		20 inch Dia
			LF	LF	LF	

100-35
04-19-16

SUMMARY OF STORMWATER STORAGE

Basin No.	Item	Total Storage Volume Provided	Total Storage Volume Required	Remarks
		CF	CF	

100-36
04-18-17

**OPEN-THROAT CURB INTAKE
SEDIMENT FILTER**

Possible Detail: 570-6

Location Station	Side	Installation	Maintenance	Removal	Remarks
		LF	EACH	EACH	

O

V

110-12A: Pollution Prevention Plan

232-3A: Erosion Control (Rural Seeding)

232-3B: Erosion Control (Urban Seeding)

232-3C: Erosion Control (Native Grass Seeding)

232-11: Erosion Control (Stabilizing Crop Seeding)

281-1: Section 404 Permit and Conditions

281-2: Individual Storm Water Permit

282-1: Restricted Stream Access

POLLUTION PREVENTION PLAN

This project is regulated by the requirements of the Iowa Department of Natural Resources (IDNR) National Pollutant Discharge Elimination System (NPDES) General Permit No. 2 OR an Iowa Department of Natural Resources (IDNR) National Pollutant Discharge Elimination System (NPDES) Individual storm water permit. The Contractor shall carry out the terms and conditions of this permit and the Pollution Prevention Plan (PPP).

This Base PPP includes information on Roles and Responsibilities, Project Site Description, Controls, Maintenance Procedures, Inspection Requirements, Non-Storm Water Controls, Potential Sources of Off Right-of-Way Pollution, and Definitions. This plan references other documents rather than repeating the information contained in the documents. A copy of this Base Pollution Prevention Plan, amended as needed per plan revisions or by contract modification, will be readily available for review.

All contractors shall conduct their operations in a manner that controls pollutants, minimizes erosion, and prevents sediments from entering waters of the state and leaving the highway right-of-way. The prime contractor shall be responsible for compliance and implementation of the PPP for their entire contract. This responsibility shall be further shared with subcontractors whose work is a source of potential pollution as defined in this PPP.

I. ROLES AND RESPONSIBILITIES

- A. Designer:
 1. Prepares Base PPP included in the Project plan.
 2. Prepares Notice of Intent (NOI) submitted to Iowa DNR.
 3. Signature authority on the Base PPP and NOI.
- B. Contractor:
 1. Affected contractors/subcontractors are co-permittees with the IDOI and will sign a certification statement adhering to the erosion controls or involved in land disturbing activities. All co-permittees are legally required under the Clean Water Act and the Iowa Administrative Code to ensure compliance with the terms and conditions of this PPP.
 2. Submit an Erosion Control Implementation Plan (ECIP) according to Specifications Section 2602 and any additional plan notes.
 3. Install and maintain appropriate controls.
 4. Supervise and implement good housekeeping practices.
 5. Conduct joint required inspections of the site with inspection staff.
 6. Comply with training and certification requirements of Specifications Section 2602.
- C. RCE/Inspector:
 1. Update PPP whenever there is a change in design, construction, operation or maintenance, which has a significant effect on the erosion control plan.
 2. Maintain an up-to-date record that identifies contractors and subcontractors as co-permittees.
 3. Make plans available to the DNR upon their request.
 4. Conduct joint required inspections of the site with the contractor/subcontractor.
 5. Complete an inspection report after each inspection.
 6. Signature authority on storm water inspection reports and Notice of Discontinuation (NOD).

III. PROJECT SITE DESCRIPTION

- A. This Pollution Prevention Plan (PPP) is for the construction of a "Describe Type Of Facility".
- B. This PPP covers approximately "Provide # Of Acres" acres with an estimated "Provide # Of Acres" acres being disturbed. The portion of the PPP covered by this contract has "Provide # Of Acres" acres disturbed.
- C. The PPP is located in an area of "Provide # Of Types Of Soil Association" soil association ("Provide Soil Association Type 0# Types"). The estimated weighted average runoff coefficient number for this PPP after completion will be "Provide runoff coefficient number".
- D. Storm Water Site Map - Multiple sources of information comprise the base storm water site map including:
 1. Drainage patterns - Plan and Profile sheets and Situation plans.
 2. Proposed Slopes - Cross Sections.
 3. Areas of Soil Disturbance - construction limits shown on Plan and Profile sheets.
 4. Locations of Structural Controls - Tabulations on C sheets.
 5. Locations of Non-Structural Controls - Tabulations on C sheets.
 6. Locations of Stabilization Practices - Generally within construction limits shown on Plan and Profile sheets.
 7. Surface Waters (including wetlands) - Project Location Map and Plan and Profile sheets.
- E. The base site map is amended by contract modifications and progress payments (fieldbook entries) of completed erosion control work. Also, due to project phasing, erosion and sediment controls shown on project plans may not be installed until needed, based on site conditions. For example, silt fence ditch checks will typically not be installed until the ditch has been installed. Fieldbook entries may also be modified from tabulation locations by field staff. Installed locations will be documented by fieldbook entries.
- F. Runoff from this work will flow into "List Outlets For Runoff".

III. CONTROLS

- A. The contractor's ECIP specified in Article 2602.03 for accomplishment of storm water controls should clearly describe the intended sequence of major activities and for each activity define the control measure and the timing during the construction process that the measure will be implemented.
- B. Preserve vegetation in areas not needed for construction.
- C. Sections 2601 and 2602 of the Standard Specifications define requirements to implement erosion and sediment control measures. Actual quantities used and installed locations may vary from the Base PPP and amendment of the plan will be documented via fieldbook entries or by contract modification. Additional erosion and sediment control items may be required as determined by the Inspector and/or by contractor during storm water monitoring inspections. If the work involved is not applicable to any contract item, the work will be noted according to Article 1109.05 Paragraph B.
1. EROSION AND SEDIMENT CONTROLS
 - a. Stabilization Practices
 1. Site plans will ensure that existing vegetation or natural buffers are preserved where attainable and disturbed portions of the site will be stabilized.
 2. Stabilization practices shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased.
 3. Temporary stabilizing seeding shall be completed as the disturbed areas are constructed. If construction activity is not planned to occur in a disturbed area for at least 21 days, the area shall be stabilized by temporary seeding or mulching within 14 days.
 4. Permanent and Temporary Stabilization practices to be used for this project are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan. Typical drawings detailing construction of the practices to be used on this project are referenced in the Standard Road

POLLUTION PREVENTION PLAN

Plans Tabulation.

- 5) Preservation of existing Vegetation within right-of-way or easements will act as vegetative buffer strips.
- 6) Preservation of topsoil: Bid items to be used for this project are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan. Additional information may be found in Tabulations in the C or T sheets of the plans or is referenced in Standard Specifications Section 2105.

- b. Structural Practices
 - 1) Structural Practices will be implemented to divert flows from exposed soils and detain or otherwise limit runoff and the potential for pollutants from erosion of the site. Additional practices include:
 - a) Provide 5000 cubic feet of storage per acre drained or equivalent sediment controls structures that withdraw water from surface when discharging basins, and controls to direct storm water to vegetated areas.
 - b) Structural practices to be used for this project are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan, as well as all other item specific Tabulations. Typical drawings detailing construction of the devices to be used on this project can be found on the B sheets of the plans or are referenced in the Standard Road Plans Tabulation.
 - c. Storm Water Management
 - 1) Measures shall be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. This may include velocity dissipation devices at discharge locations and along length of outfall channel as necessary to provide a non-erosion velocity flow from structure to water course. If included with this project, these items are located in the Estimated Project Quantities (100-0A, 100-1A, or 100-1C) and Estimate Reference Information (100-4A) located on the C sheets of the plan, as well as all other item specific Tabulations and drawings on the B sheets of the plans or are referenced in the Standard Road Plans Tabulation. The installation of these devices may be subject to Section 404 of the Clean Water Act.

2. OTHER CONTROLS

- a. Contractor disposal of unused construction materials and construction material wastes shall comply with applicable state and local waste disposal, sanitary sewer, or septic system regulations. In the event of a conflict with other governmental laws, rules and regulations, the more restrictive laws, rules or regulations shall apply.
 - 1) Vehicle Entrances and Exits - Construct and maintain entrances and exits to prevent tracking of sediments onto roadways.
 - 2) Material Delivery, Storage and Use - Implement practices to prevent discharge of construction materials during delivery, storage, and use.
 - 3) Stockpile Management - Install controls to reduce or eliminate pollution of storm water from stockpiles of soil and paving.
 - 4) Waste Disposal - Do not discharge any materials, including building materials, into waters of the state, except as provided in Section 404 of the Clean Water Act.
 - 5) Spill Prevention and Control - Implement procedures to contain and clean-up spills and prevent material discharges to the storm drain system and waters of the state.
 - 6) Concrete Residuals and Washout Wastes - Designate temporary concrete washout facilities for rinsing out concrete trucks. Provide directions to truck drivers where designated washout facilities are located. Designated washout areas should be located at least 50 feet away from storm drains, streams or other water bodies. Care should be taken to ensure these facilities do not overflow during storm events.
 - 7) Concrete Grooving/Grinding Slurry - Do not discharge slurry to a waterbody or storm drain. Slurry may be applied on foreslopes or removed from the project.
 - 8) Vehicle and Equipment Storage and Maintenance Areas - Perform on site fueling and maintenance in accordance with all environmental laws such as proper storage of outside fuels and proper disposal of used engine oil or other fluids on site. Employ washing practices that prevent contamination of surface and ground water from wash water.
 - 9) Better management - Ensure employees properly dispose of litter and sediment before it re-enters a waterbody or discharges off-site.
 - 10) Measures are also to be taken to prevent scour erosion at dewatering discharge point.

3. APPROVED STATE OR LOCAL PLANS

During the course of this construction, it is possible that situations will arise where unknown materials will be encountered. When such situations are encountered, they will be handled according to all Federal, state, and local regulations in effect at the time.

IV. MAINTENANCE PROCEDURES

The contractor is required to maintain all temporary erosion and sediment control measures in proper working order, including cleaning, repairing, or replacing them throughout the contract period. This shall begin when the features have lost 50% of their capacity.

V. INSPECTION REQUIREMENTS

- A. The contractor shall be made jointly by the contractor and the contracting authority at least once every seven calendar days. Storm water monitoring inspections will include:
 1. Date of the inspection.
 2. Summary of the scope of the inspection.
 3. Name and qualifications of the personnel making the inspection.
 5. Review erosion and sediment control measures within disturbed areas for the effectiveness in preventing impacts to receiving waters.
 6. Major observations related to the implementation of the PPP.
 7. Identify corrective actions required to maintain or modify erosion and sediment control measures.
- B. Identify storm water monitoring inspection reports in the Amended PPP. Incorporate any additional erosion and sediment control measures determined as a result of the inspection. Immediately begin corrective actions on all deficiencies found within 3 calendar days of the inspection.

VI. NON-STORM WATER DISCHARGES

This includes subsurface drains (i.e. longitudinal and standard subdrains) and slope drains. The velocity of the discharge from these features may be controlled by the use of patio blocks, Class A stone, erosion stone or other appropriate materials. This also includes uncontaminated groundwater from dewatering operations, which will be controlled as discussed in Section III of the PPP.

VII. POTENTIAL SOURCES OF OFF RIGHT-OF-WAY (ROW) POLLUTION

Silts, sediment, and other forms of pollution may be transported onto highway right-of-way (ROW) as a result of a storm event. Potential sources of pollution located outside highway ROW are beyond the control of this PPP. Pollution within highway ROW will be conveyed and controlled per this PPP.

VIII. DEFINITIONS

- A. Base PPP -- Initial Pollution Prevention Plan.
- B. Amended PPP -- May include Plan Revisions or Contract Modifications for new items, storm water monitoring inspection reports, and

POLLUTION PREVENTION PLAN

fieldbook entries made by the inspector.
C. IDR - Inspector's Daily Report - this contains the inspector's daily diary and bid item postings.
D. Controls - Methods, practices, or measures to minimize or prevent erosion, control sedimentation, control storm water, or minimize contaminants from other types of waste or materials. Also called Best Management Practices (BMPs).
E. Signature Authority - Representative from Designer, Contractor/Subcontractor, or RCE/Inspector authorized to sign various storm water documents.

CERTIFICATION STATEMENT
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Printed or Typed Name

Signature

Printed or Typed Name

232-3A
10-20-15

**EROSION CONTROL
(RURAL SEEDING)**

Following the completion of work in a disturbed area, place seed, fertilizer, and mulch on the disturbed area lying 8 feet adjacent to shoulder and median as follows:

Use seed mix and fertilizer meeting the requirements of Article 2601.03,C,3 and Section 4169 of the Standard Specifications.

Use mulch meeting the requirements of Articles 2601.03,E,2,a and 4169.07,A of the Standard Specifications.

Preparing the seedbed and furnishing and applying seed, fertilizer, and mulch is incidental to mobilization and will not be paid for separately.

232-3B
10-20-15

**EROSION CONTROL
(URBAN SEEDING)**

Following the completion of work in a disturbed area, place seed, fertilizer, and mulch on the disturbed area as follows:

Use seed mix and fertilizer meeting the requirements of Article 2601.03,C,4 and Section 4169 of the Standard Specifications.

Use mulch meeting the requirements of Articles 2601.03,E,2,a and 4169.07,A of the Standard Specifications.

Preparing the seedbed and furnishing and applying seed, fertilizer, and mulch is incidental to mobilization and will not be paid for separately.

232-3C
10-20-15

EROSION CONTROL (NATIVE GRASS SEEDING)

Following the completion of work in a disturbed area, place seed and mulch on the disturbed area lying 8 feet or more beyond the shoulder as follows:

SEED MIX:

Big bluestem (*Andropogon gerardii*) 6 lbs. PLS/Acre (7.0 kg/ha)
Indiangrass (*Sorghastrum nutans*) 6 lbs. PLS/Acre (7.0 kg/ha)
Little bluestem (*Schizachyrium scoparium*) 6 lbs. PLS/Acre (7.0 kg/ha)
Partridge Pea (*Chamaecrista fasciculata*) 4 lbs. PLS/Acre (4.5 kg/ha)
Sideoats grama (*Bouteloua curtipendula*) 4 lbs. PLS/Acre (4.5 kg/ha)
Canada wildrye (*Elymus canadensis*) 2 lbs. PLS/Acre (2.2 kg/ha)
Switchgrass (*Panicum virgatum*) 1 lbs. PLS/Acre (1.1 kg/ha)
Oats (*Avena sativa*) 32 lbs./Acre (36.0 kg/ha)

Furnish Big bluestem, Indiangrass, Canada wildrye and Little bluestem that is debarbed or equal to facilitate the application of seed.

Furnish seed certified as Source Identified Class (Yellow Tag) Source G0-Iowa. Oats are excluded from this requirement.

Use seed meeting requirements of Article 4169.02 of the Standard Specifications.

Use mulch meeting the requirements of Articles 2601.03, E,2,a and 4169.07,A of the Standard Specifications.

Preparing the seedbed and furnishing and applying seed and mulch is incidental to mobilization and will not be paid for separately.

232-11
10-20-15

**EROSION CONTROL
(STABILIZING CROP SEEDING)**

Following the completion of work in a disturbed area, place stabilizing crop, fertilizer, and mulch on the disturbed area as follows:

Use seed mix and fertilizer meeting the requirements of Article 2601.03,C,1 and Section 4169 of the Standard Specifications.

Use mulch meeting the requirements of Articles 2601.03,E,2,a and 4169.07,A of the Standard Specifications.

Preparing the seedbed and furnishing and applying seed, fertilizer, and mulch is incidental to mobilization and will not be paid for separately.

281-1
10-18-16

SECTION 404 PERMIT AND CONDITIONS

Construct this project according to the requirements of U.S. Army Corps of Engineers _____, Permit No. _____. A copy of this permit is available from the Iowa DOT website (<http://www.envpermits.iowadot.gov/>). The U.S. Army Corps of Engineers reserves the right to visit the site without prior notice.

281-2
10-15-13

INDIVIDUAL STORM WATER PERMIT

This project is regulated by the requirements of Iowa Department of Natural Resources (DNR) National Pollutant Discharge Elimination System (NPDES) permit, Permit No. ##-##-##. A copy of this permit is available from the Iowa DOT Office of Contracts upon request. Co-permittee certification statement requirements from Standard Specifications Section 2602 apply.

282-1
10-19-10

RESTRICTED STREAM ACCESS

A low water crossing for the Contractor's convenience is not allowed on this project. Stream bank disturbance and access to "Name of Creek, Stream, or River" is not allowed unless specifically designated in the plans. No other access will be allowed.

Road Design Details

570-1: Slash Mulch Berm

570-2: Rock Check Dam

570-3: Temporary Sediment Control Basin

570-4: Silt Fence Installation for Shallow or No Ditch

570-5: Erosion Control for Intake or Manhole Well

570-6: Open-Throat Curb Intake Sediment Filter

570-7: Grade Intake Sediment Filter Bag

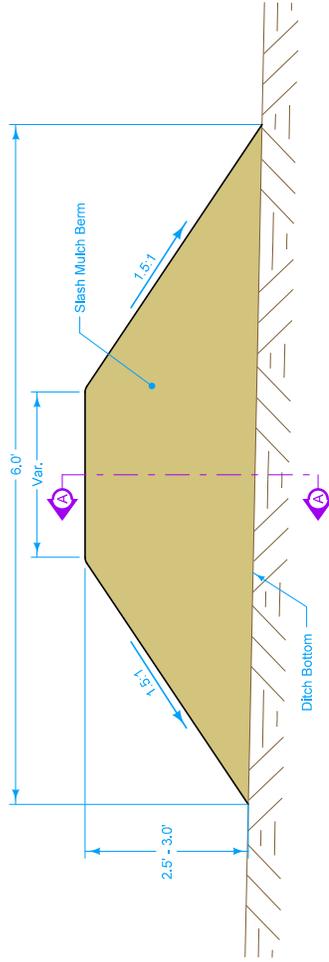
570-9: Erosion Control for Trenchless Construction

570-10: Stabilized Construction Entrance

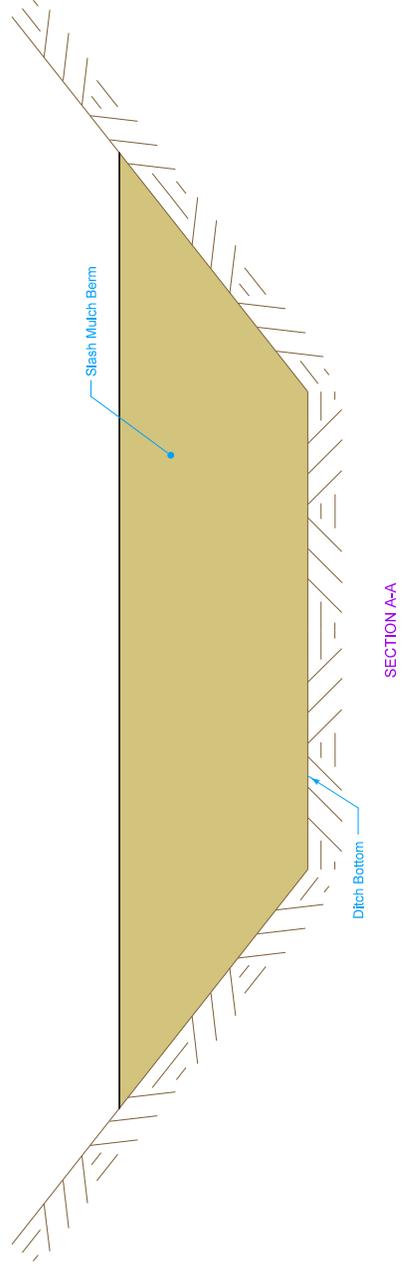
DESIGNER INFO

Slash mulch consists of waste material from cleaning and grubbing. Use material with a maximum length of 20 inches and maximum width of 2 inches for individual pieces. Material will be accepted based on visual inspection.

Dispose of the slash mulch berm material off the project unless the Engineer approves a suitable site within the project limits.



DITCH PROFILE



	REVISION	10-18-16
	1	

ROAD DESIGN DETAIL	570-1
SHEET 1 of 1	

REVISIONS: Corrected type from "mulch" to "mudch" in general notes.

SLASH MULCH BERM

DESIGNER INFO

Use Class D Revetment to construct Rock Check Dam.

Method of Measurement for Rock Check Dam will be in linear feet to the nearest 0.1 feet.

Basis of Payment for Rock Check Dam will be the contract unit price per linear foot. Payment is full compensation for all materials, labor, and equipment required to construct the Rock Check Dam as shown. Class 10 excavation required to cut trench and engineering fabric installed prior to placing revetment are incidental and will not be paid for separately.

Method of Measurement for Maintenance of Rock Check Dam will be by count.

Basis of Payment for Maintenance of Rock Check Dam will be at the contract unit price for each occurrence. Payment is full compensation for clean out and disposal of material when capacity reaches 50%, and for any repair that is needed during the project.

Method of Measurement for Removal of Rock Check Dam will be by count.

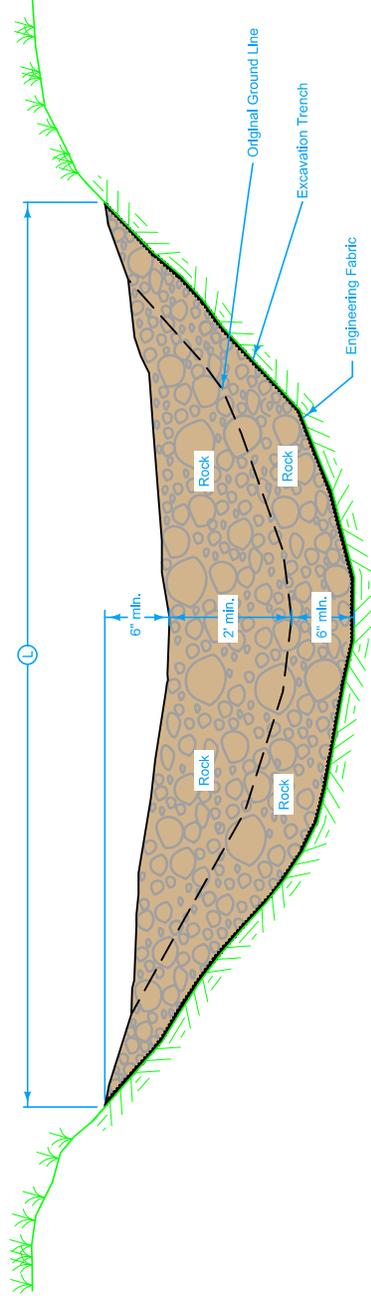
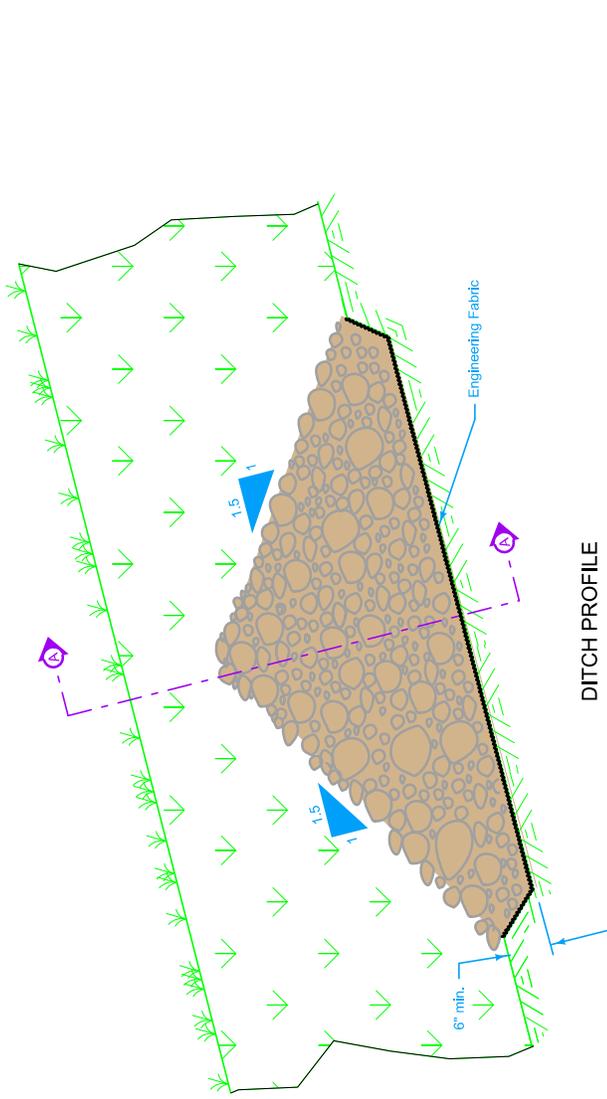
Basis of Payment for Removal of Rock Check Dam will be at the contract unit price for each Rock Check Dam removed. Payment is full compensation for all labor and equipment required to remove all rock and material above original ditch grade. Rock, silt, and engineering fabric that is flush with and/or below final ditch grade will be allowed to remain in the excavation trench.

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

Possible Tabulation:
 100-32

IOWA DOT	REVISION
	NEW 04-19-16
ROAD DESIGN DETAIL	570-2
	SHEET 1 of 1
REVISIONS: New	

ROCK CHECK DAM



DESIGNER INFO

Measurement for Temporary Sediment Control Basin will be by count.

Basis of Payment for Temporary Sediment Control Basin will be at the contract unit price for each device installed. Payment is full compensation for furnishing all equipment, labor, and materials required to construct the Temporary Sediment Control Basin as shown.

Method of Measurement for Maintenance of Temporary Sediment Control Basin will be by count.

Basis of Payment for Maintenance of Temporary Sediment Control Basin will be at the contract unit price for each occurrence. Payment is full compensation for clean out and disposal of material when capacity reaches 50%, and for any other repair needed during the project.

Measurement for Removal of Temporary Sediment Control Basin will be by count.

Basis of Payment for Removal of Temporary Sediment Control Basin will be at the contract unit price for each device removed. Payment is full compensation for all labor and equipment required to remove all rock and material above designed ditch grade and to place topsoil per note 3 below. Rock and engineering fabric that is flush with and/or below designed ditch grade will be allowed to remain in place.

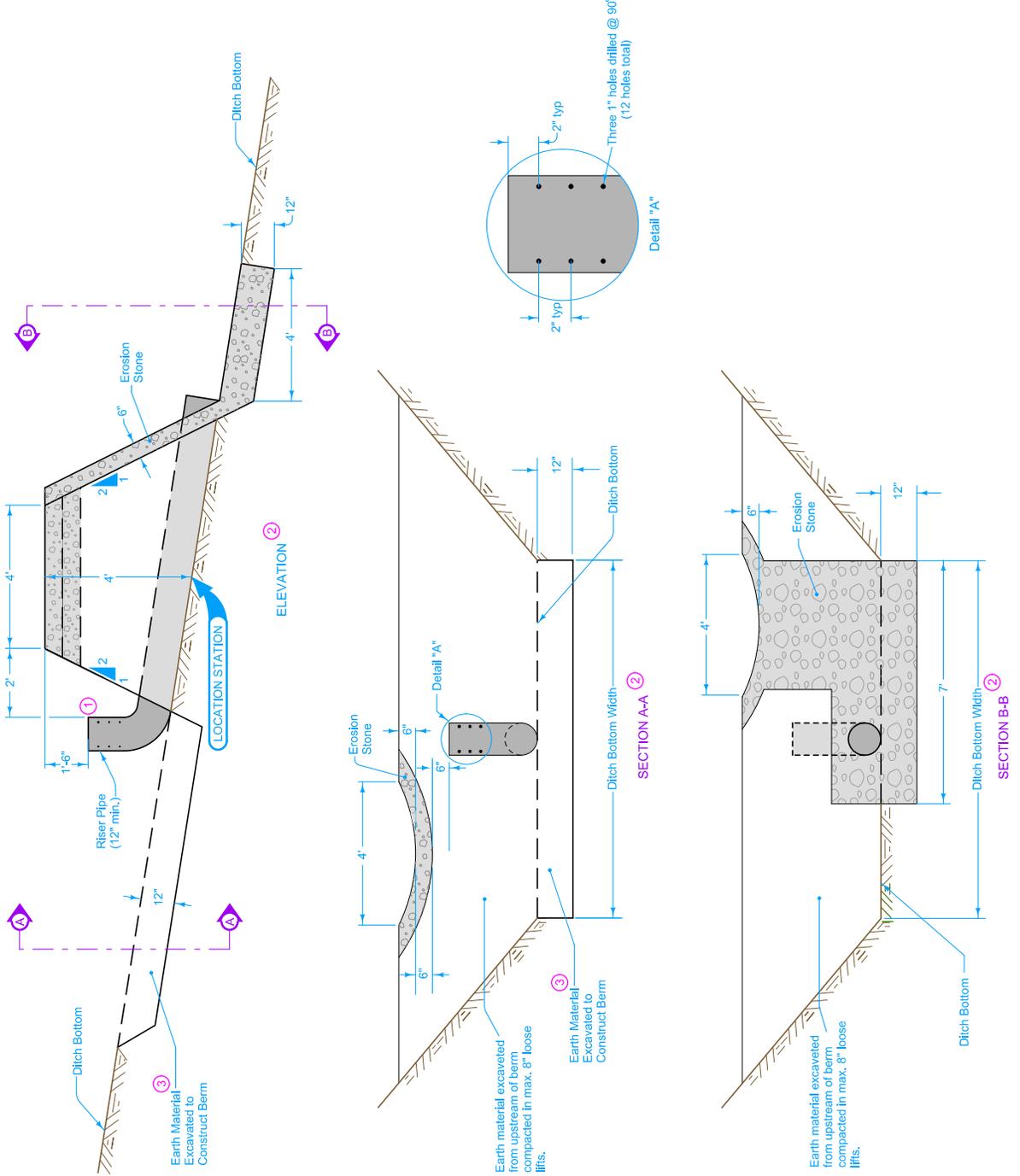
- ① Ensure Riser Pipe remains vertical.
- ② Dimensions shown are minimums.
- ③ When Temporary Sediment Control Basin is removed, if basin has not silted in to designed ditch grade, use topsoil to bring up to designed ditch grade.

Possible Contract Items:
 Temporary Sediment Control Basin
 Maintenance of Temporary Sediment Control Basin
 Removal of Temporary Sediment Control Basin

Incidental to Temporary Sediment Control Basin:

- Erosion Stone
- Pipe
- Excavated Earth Material

Possible Tabulation:
 100-33



IOWA DOT	REVISION
	1 10-18-16

ROAD DESIGN DETAIL	570-3
SHEET 1 of 1	

REVISIONS: Changed Posthole Tabulation from 100-30 to 100-33.

TEMPORARY SEDIMENT CONTROL BASIN

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 device exerting 60 p.s.i. or greater.

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

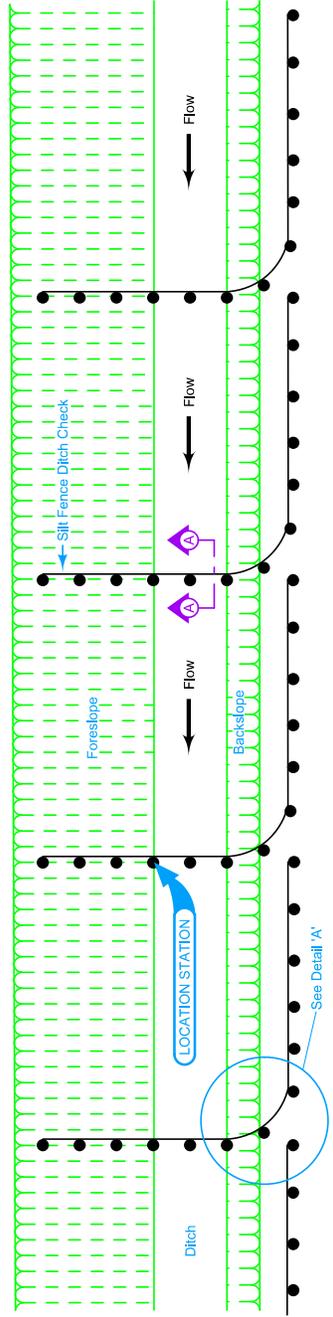
- 1 Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire. See attachment to post.
- 2 Embed all posts 28 inches below the ground line.
- 3 The minimum end span (in feet) = 2 X Foreslope (H:V).
- 4 Locate posts at toe of foreslope and toe of backslope and space remaining posts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

Possible Contract Items:
Silt Fence for Ditch Checks

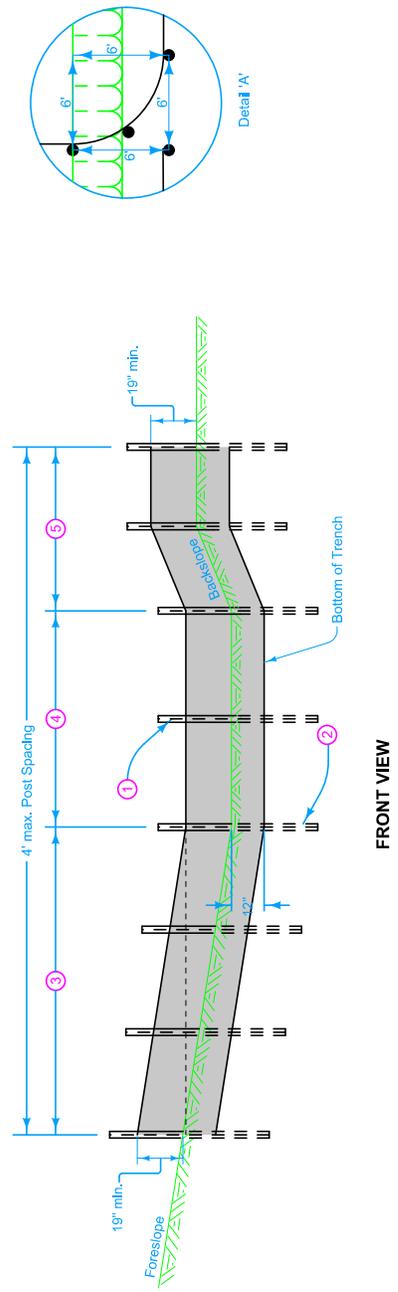
Possible Tabulations:
100-18

IOWA DOT	REVISION
	NEW 10-18-16
ROAD DESIGN DETAIL	570-4
	SHEET 1 of 3
REVISIONS: NEW	

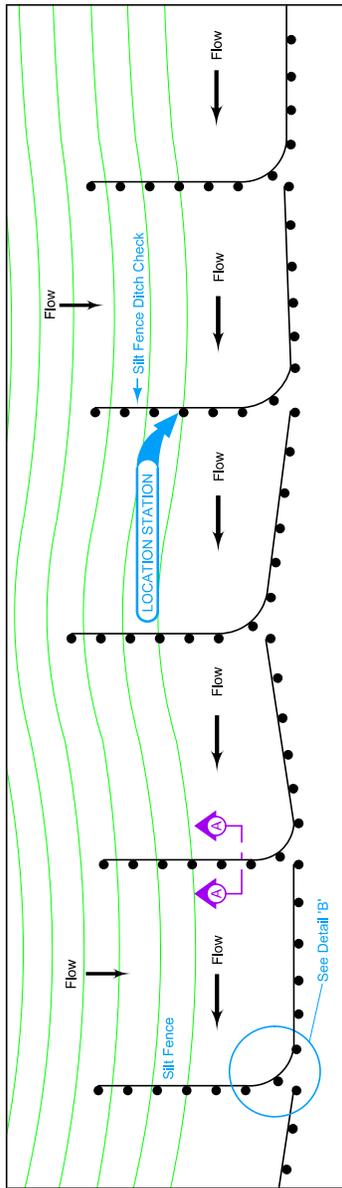
**SILT FENCE INSTALLATION
FOR SHALLOW OR NO DITCH**



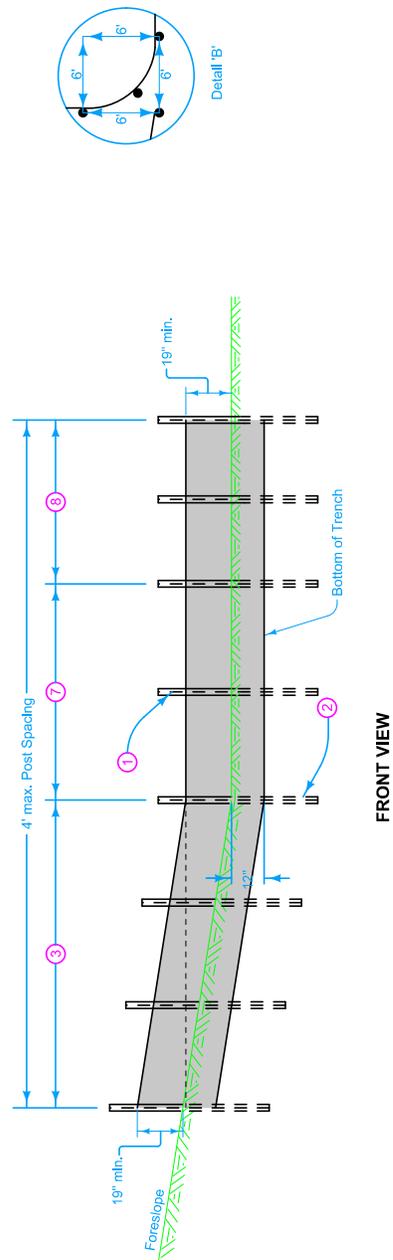
PLAN FOR SILT DITCH (SHALLOW DITCH SECTION-TYPE 4)



FRONT VIEW



PLAN FOR SILT FENCE (NO DITCH SECTION-TYPE 5) (B)



FRONT VIEW

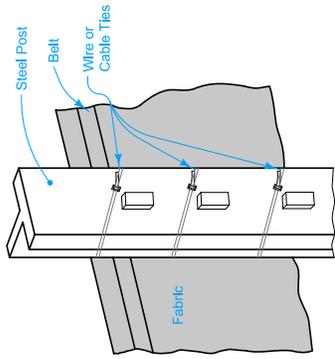
- 1 Secure top of engineering fabric to steel posts using cable ties (50 lb.) or wire. See attachment to post.
- 2 Embed all posts 28 inches below the ground line.
- 3 The minimum end span (in feet) = 2 X Foreslope (H:V).
- 4 Refer to tabulation 100-18.
- 5 Locate post at toe of foreslope. Locate 2 additional posts at 4 foot spacing.
- 6 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.



Contour Lines

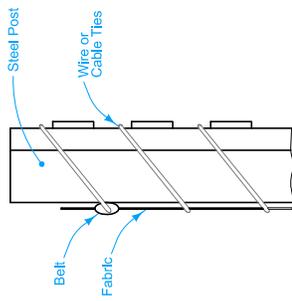
IOWA DOT	REVISION
	NEW 10-18-16
ROAD DESIGN DETAIL	570-4
REVISIONS: NEW	SHEET 2 of 3

SILT FENCE INSTALLATION
FOR SHALLOW OR NO DITCH



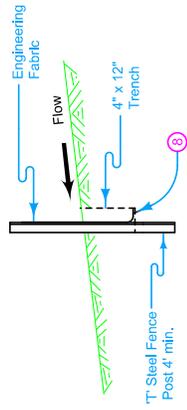
BACK VIEW
ATTACHMENT TO POST

③ For manual installation only, fold engineering fabric along bottom of trench.



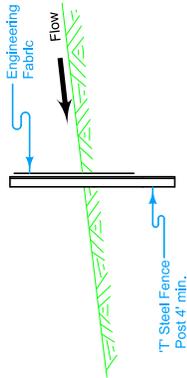
PROFILE VIEW
ATTACHMENT TO POST

DITCH CHECK - MANUAL INSTALLATION



SECTION A-A

DITCH CHECK - MACHINE INSTALLATION



SECTION A-A

IOWA DOT	REVISION
	NEW 10-18-16
ROAD DESIGN DETAIL	570-4
	SHEET 3 of 3
REVISIONS: NEW	

**SILT FENCE INSTALLATION
FOR SHALLOW OR NO DITCH**

DESIGNER INFO

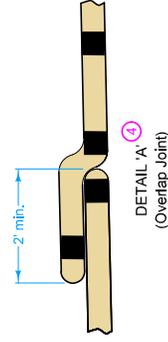
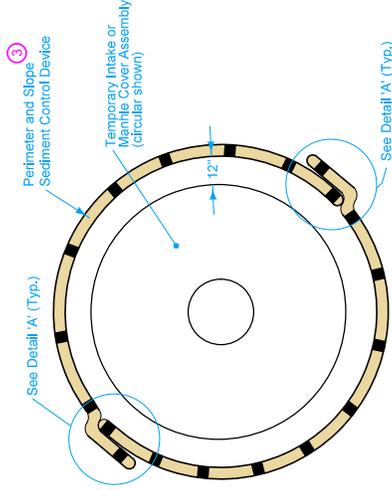
- 1 Wrap fabric sock around tube riser. Use fabric complying with Article 4196.01, B, 1 with a minimum flow rate of 90 gallons per minute per square foot. Ensure top of sock is below form grade elevation.
- 2 Tube riser may be such that it can be pushed down and pulled up.
- 3 Place Perimeter and Slope Sediment Control Devices around all intake or manhole wells. Use 20 inch diameter device.
- 4 Extra material required to install overlaps will not be included in the installation length.

Possible Contract Items:
 Temporary Intake or Manhole Cover Assembly
 Perimeter and Slope Sediment Control Device

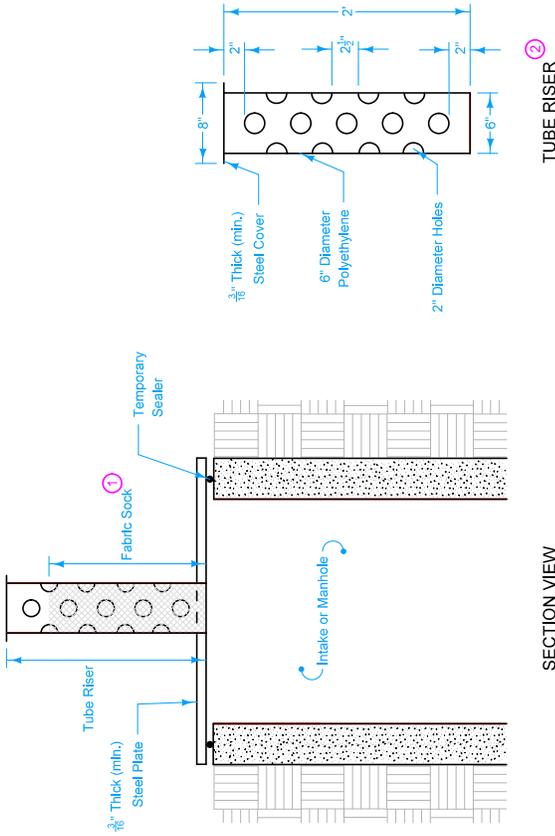
Possible Tabulations:
 100-11
 100-19

IOWA DOT	REVISION
	NEW 10-18-16
ROAD DESIGN DETAIL	570-5
	SHEET 1 of 1
REVISIONS: New	

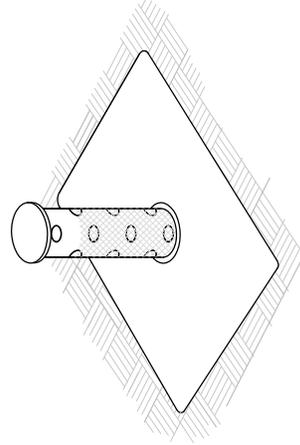
EROSION CONTROL FOR INTAKE OR MANHOLE WELL



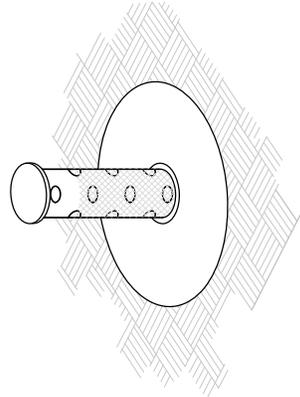
PERIMETER AND SLOPE SEDIMENT CONTROL



SECTION VIEW



ISOMETRIC VIEW (Rectangular)



ISOMETRIC VIEW (Circular)

TEMPORARY INTAKE OR MANHOLE COVER ASSEMBLY

Remove sediment filter upon stabilization of sediment sources.

Measurement for Open-throat Curb Intake Sediment Filter will be in feet to the nearest foot.

Basis of Payment for Open-throat Curb Intake Sediment Filter will be at the contract unit price per foot. Payment is full compensation for furnishing all equipment, labor, and materials required to install the Open-throat Curb Intake Sediment Filter as shown.

Method of Measurement for Maintenance of Open-throat Curb Intake Sediment Filter will be by count.

Basis of Payment for Maintenance of Open-throat Curb Intake Sediment Filter will be at the contract unit price for each occurrence. Payment is full compensation for clean out and disposal of material when sediment accumulation depth reaches 2 inches, and for any other repair needed during the project.

Measurement for Removal of Open-throat Curb Intake Sediment Filter will be by count.

Basis of Payment for Removal of Open-throat Curb Intake Sediment Filter will be at the contract unit price for each Open-throat Curb Intake Sediment Filter removed. Payment is full compensation for all labor and equipment required for removal.

- ① Trim frame as needed to tightly fit in the intake throat. Overlap fabric a minimum of 3 inches and securely fasten.
- 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.

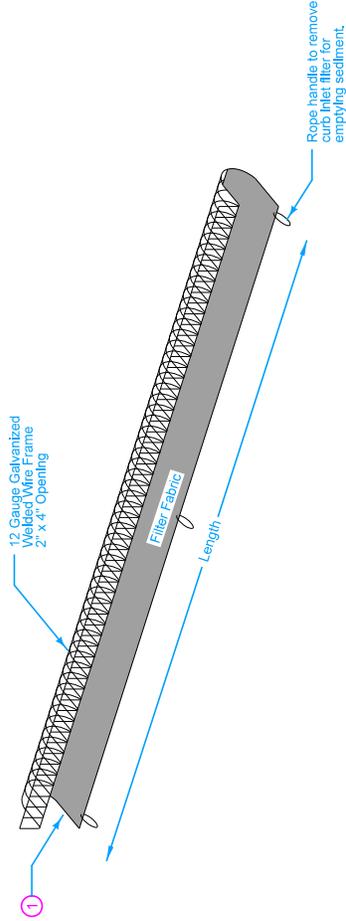
Possible Contract Items:

- Open-throat Curb Intake Sediment Filter
- Maintenance of Open-throat Curb Intake Sediment Filter
- Removal of Open-throat Curb Intake Sediment Filter

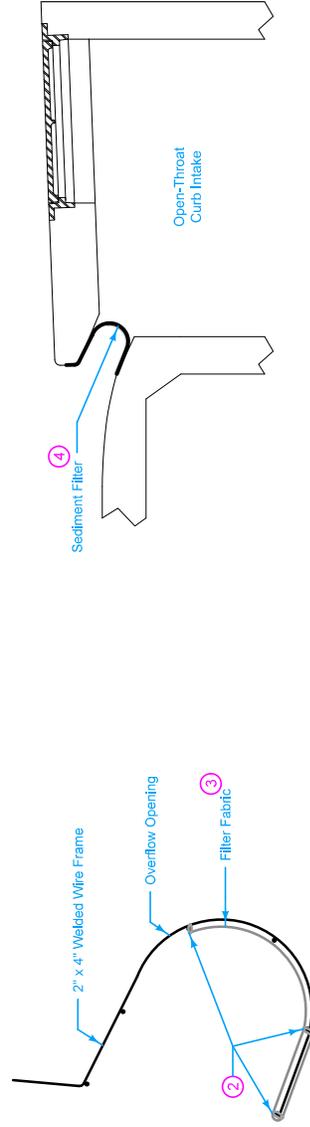
Possible Tabulation:
100-36

IOWA DOT	REVISION
	NEW 04-18-17
570-6	
ROAD DESIGN DETAIL	
SHEET 1 of 1	
REVISIONS: NEW	

**OPEN-THROAT CURB INTAKE
SEDIMENT FILTER**



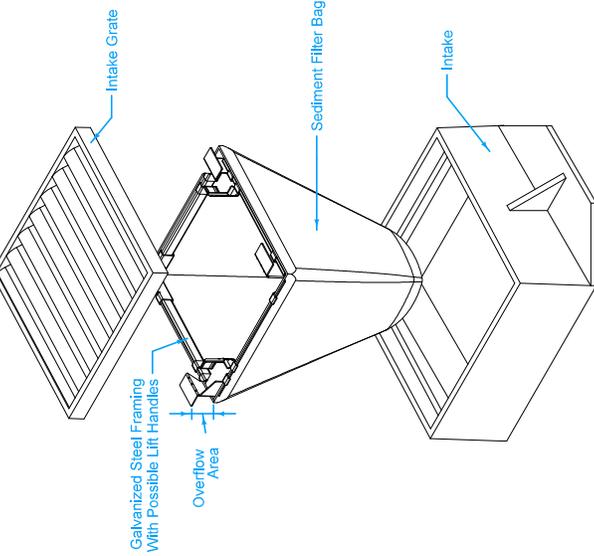
OPEN-THROAT CURB INTAKE SEDIMENT FILTER



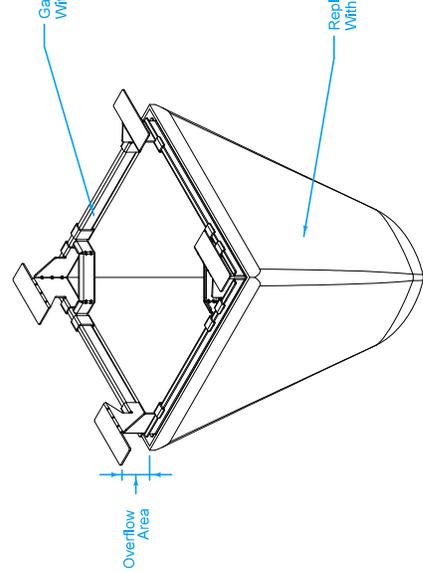
SEDIMENT FILTER CROSS SECTION

SEDIMENT FILTER PLACEMENT

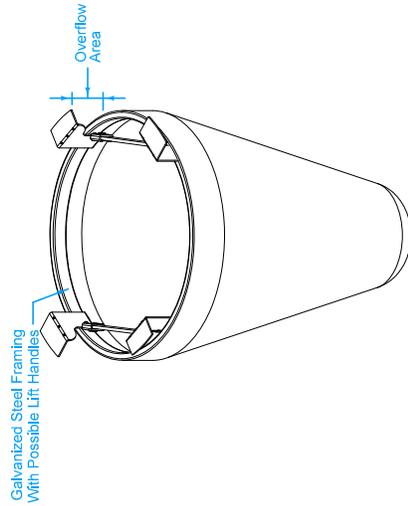
DESIGNER INFO



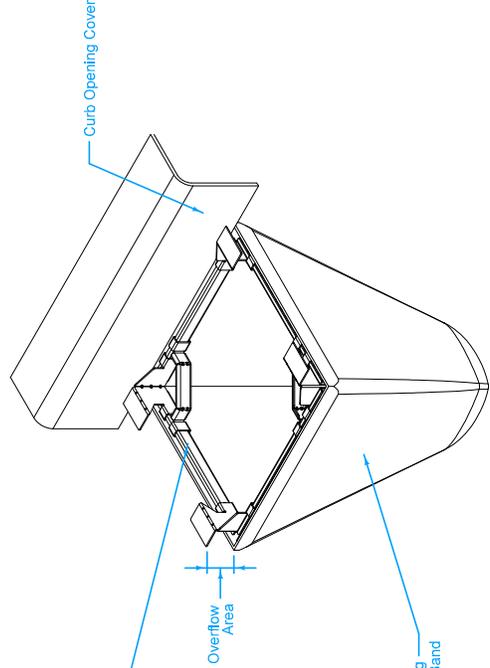
TYPICAL SEDIMENT FILTER BAG PLACEMENT



SEDIMENT FILTER BAG FOR SQUARE OR RECTANGULAR GRATE



SEDIMENT FILTER BAG FOR CIRCULAR GRATE



SEDIMENT FILTER BAG FOR COMBINATION GRATE WITH CURB OPENING

Remove sediment filter bag upon stabilization of sediment sources.

Measurement for Grate Intake Sediment Filter Bag will be by count.

Basis of Payment for Grate Intake Sediment Filter Bag will be at the contract unit price for each device installed. Payment is full compensation for furnishing all equipment, labor, and materials required to install the Grate Intake Sediment Filter Bag as shown.

Method of Measurement for Maintenance of Grate Intake Sediment Filter Bag will be by count.

Basis of Payment for Maintenance of Grate Intake Sediment Filter Bag will be at the contract unit price for each occurrence. Payment is full compensation for clean out and disposal of material when capacity reaches 50%, and for any other repair needed during the project.

Measurement for Removal of Grate Intake Sediment Filter Bag will be by count.

Basis of Payment for Removal of Grate Intake Sediment Filter Bag will be at the contract unit price for each device removed. Payment is full compensation for all labor and equipment required for removal.

① 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.

Possible Contract Items:

Grate Intake Sediment Filter Bag

Maintenance of Grate Intake Sediment Filter Bag

Removal of Grate Intake Sediment Filter Bag

Possible Tabulation:

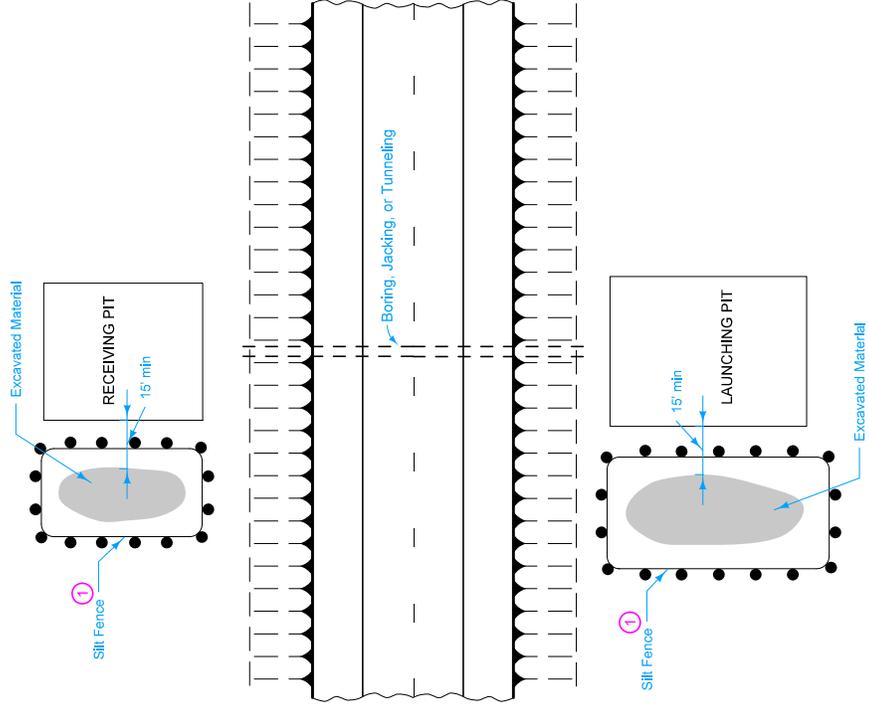
100-37

IOWA DOT	REVISION	NEW	04-18-17
	ROAD DESIGN DETAIL		570-7
REVISIONS: NEW			SHEET 1 of 1

GRATE INTAKE
SEDIMENT FILTER BAG

**DESIGNER
INFO**

- ① Install silt fence to enclose excavated material.



Possible Contract Items:
 Silt Fence
 Removal of Silt Fence or Silt Fence for Silt Ditch Check
 Possible Tabulations:
 100-17

IOWA DOT	REVISION	NEW	04-18-17
	570-09		
ROAD DESIGN DETAIL		SHEET 1 of 1	
REVISIONS: NEW			

**EROSION CONTROL FOR
TRENCHLESS CONSTRUCTION**

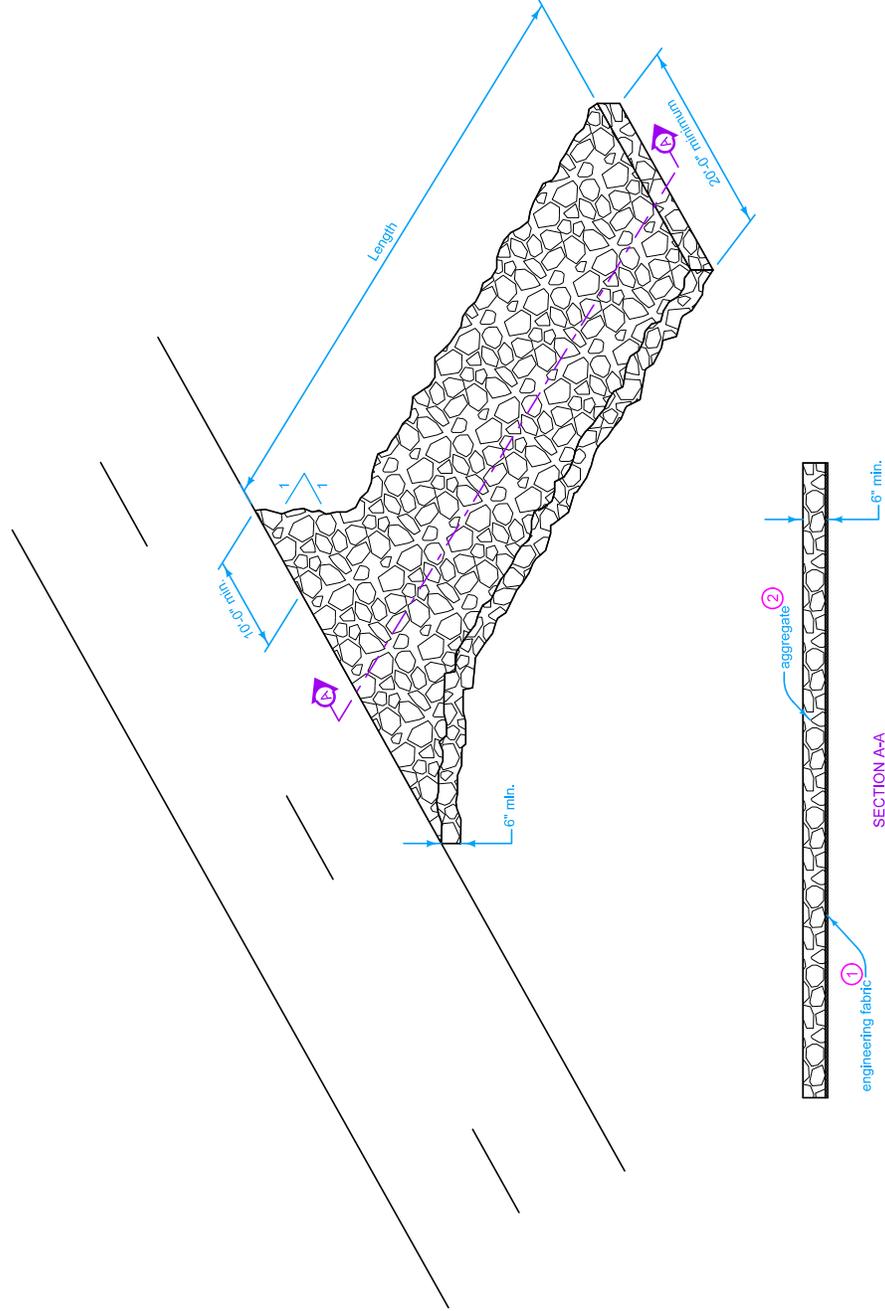
DESIGNER INFO

Obtain the Engineer's approval for location and length of stabilized entrances prior to constructing.

Method of Measurement for Stabilized Construction Entrance will be in linear feet measured along the length of the entrance at the entrance centerline.

Basis of Payment for Stabilized Construction Entrance will be at the contract unit price per linear foot. Payment is full compensation for furnishing all materials and work necessary for installation, maintenance, and removal of stabilized construction entrance. Maintenance includes installing additional material or cleaning required to maintain the entrance in a functional condition.

- ① Place engineering fabric prior to placing aggregate. Use fabric for Embankment Erosion Control complying with Section 4196 of the Standard Specifications.
- ② Use aggregate meeting Gradation No. 13 of Section 4109 of the Standard Specifications.



Possible Contract Item:
Stabilized Construction Entrance

IOWA DOT	REVISION
	NEW 04-18-17
570-10	
ROAD DESIGN DETAIL	
REVISIONS: NEW	
SHEET 1 of 1	

STABILIZED CONSTRUCTION ENTRANCE

Temporary Sediment Control Devices

Design Manual
Chapter 10
Roadside Development
and Erosion Control

Originally Issued: 12-31-97

Revised: 01-07-16

General

Sediment control devices should be considered on all projects involving earthwork. Sediment control devices are used to control sediment on new projects until permanent seeding is established. This section describes the following devices that are to be used and their bid quantities:

- [Silt Basin](#)
- [Silt Basin Bid Quantities](#)
- [Silt Dike and Ditch](#)
- [Silt Fence](#)
- [Silt Fence Bid Quantities](#)
- [Silt Fence Ditch Checks](#)
- [Silt Fence Ditch Check Bid Quantities](#)
- [Rock Check Dam Quantities](#)
- [Rock Check Dam Bid Quantities](#)
- [Temporary Sediment Control Basins](#)
- [Temporary Sediment Control Basin Bid Quantities](#)
- [Perimeter and Slope Sediment Control Devices](#)
- [Perimeter and Slope Sediment Control Devices Bid Quantities](#)
- [Silt Curtains](#)
- [Stabilized Construction Entrance](#)

The [Erosion and Sediment Control Field Guide](#) provides more information regarding erosion and sediment control.

Section [10C-2](#) provides more information regarding temporary sediment control devices used for storm water retention.

Silt Basin

A silt basin collects silt deposits from flowing water. Typically, designers decide when and where to use them. Silt basins should be strongly considered any time soil is disturbed which could result in silt flowing to a waterway. Silt basins are not required if a minimum 50 foot undisturbed vegetative buffer separates a soil disturbance from the waterway. Designers can contact Roadside Development and the Office of Construction

Quick Tips:

- Silt basins collect silt deposits from flowing water.
- Silt dikes and silt ditches trap silt in a depressed area to keep it from flowing onto private property.
- Silt fence is used to disrupt the flow of water so soil and debris will settle and collect behind the silt fence.
- Silt fence ditch checks are used to slow flow of water and to intercept soil and debris from water flowing through ditches.
- Rock check dams are typically used to replace silt fence ditch checks that fail.
- Temporary sediment control basins are used to capture sediment before it leaves the right of way.
- Perimeter and slope sediment control devices are used to capture sediment or to slow flow of water.
- Silt curtain is used for soil disturbing operations in or adjacent to a body of water.
- Stabilized construction entrances are used to reduce mud tracked on to roads.
- Include a Pollution Prevention Plan (PPP) in all projects involving a land disturbance of one acre or more.
- [Summary of bid quantities for Silt Basin, Silt Fence, Silt Fence for Ditch Check, and Rock Check Dam.](#)

and Materials for assistance.

Silt basins may be used in roadway ditches preceding drainage structure inlets (typically at last roadway pipe prior to discharging offsite) and at ditch outlets that flow offsite. Figure 1 illustrates these locations.

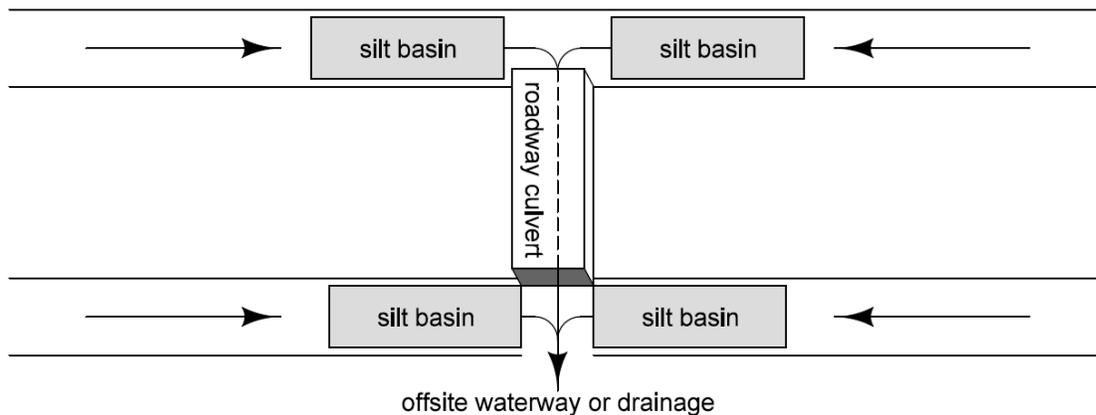


Figure 1: Typical location of silt basins.

Depending on the drainage areas, silt basins may also be placed in ditch grades of 1% to 2% at approximately 100 foot intervals. There is no maximum ditch slope for silt basins.

Standard Road Plan [EW-403](#) shows an example of a silt basin used as a final device at the end of the ditch before water leaves the right-of-way.

Tab [100-14](#) is used to list silt basin locations.

Silt Basin Bid Quantities

Grading Projects

Bid quantity = tab quantity × 2. The bid quantity is at least twice the tab quantity to reflect possible excavation to clean out and maintain basins.

Include the following bid item Estimate Reference Note:

Refer to Tab. [100-14](#). The tabulation includes estimated locations for placement of Silt Basins to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes 100% additional quantity for field adjustments and maintenance.

Paving Projects

Bid quantity = new locations × 2.5. The bid quantity is at least 2.5 times the paving tab quantity to reflect possible excavation to clean out and maintain the basins during paving project. Round the quantity up to a whole number.

Include the following bid item Estimate Reference Note:

Refer to Tab. [100-14](#). The tabulation includes estimated locations for placement of Silt Basins to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes 150% of the tab quantity for the paving project for field adjustments and maintenance.

Grade and Pave Projects

One year and two year construction season projects should be treated like a grading project.

Bridge and RCB Projects

Whether a stand-alone project or as part of a grading project, treat like a grading project.

Removal of Silt Basins

Typically, Removal of Silt Basins will be included in a permanent erosion control project. Include the bid item for Removal of Silt Basins in a grading or paving project only if it does not have a related permanent erosion control project.

Silt Dike and Silt Ditch

Silt dikes and silt ditches trap silt in a depressed area to keep it from flowing onto private property. A silt dike and/or a silt ditch may be used when the natural ground slopes away from the foreslope and roadway ditch is not provided. Examples of a silt dike and silt ditch are shown on Standard Road Plan [EW-403](#).

A silt dike is constructed longitudinally along the foreslope. A silt ditch is constructed by excavating the earth to a uniform depth below natural ground at the toe of the foreslope. Silt dikes and silt ditches may be used together or separately, depending on the situation. A silt dike may be constructed by taking the excavated material from a silt ditch and placing it to the side to form a silt dike.

Use Tab. [100-13](#) to list locations of silt ditches and Tab. [100-15](#) to list locations of silt dikes.

Silt Fence

Silt fence is constructed out of engineering fabric. It is used to disrupt the flow of water. By doing this, the soil and debris will settle out of the water and collect behind the silt fence. Silt fence should be placed anywhere from 10 feet away from the toe of the foreslope to the right of way line, running parallel to the foreslope. Silt fence typically is not required along the right-of-way line when an existing ditch will convey storm water and the existing ditch will not be disturbed during the course of the project. Silt fence should be placed around intakes when they are constructed.

Silt fence may be placed up to a maximum length of 200 feet. For every segment of silt fence that is placed, place a 20 foot J-hook segment at the lower end skewed towards the foreslope to intercept runoff (see Figure 2). This J-hook segment should be included in the tabulation and the bid items, as demonstrated in Figure 2.

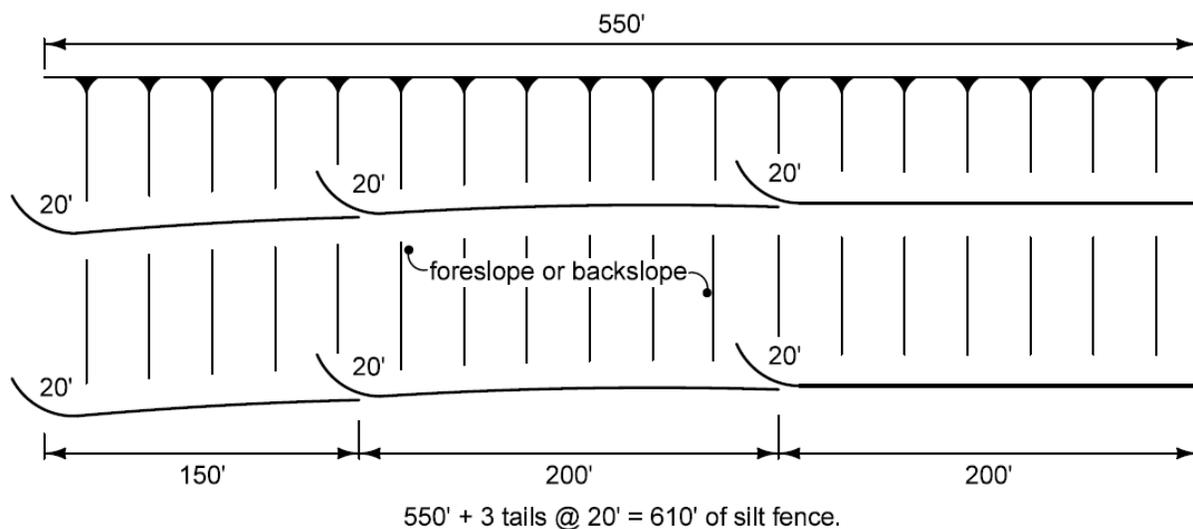


Figure 2: Silt fence placed on a slope.

Silt fence may also be placed along the contours of the slope. The need for silt fence and number of additional rows recommended depends on the height and grade of the slope. Table 1 shows recommended spacing of silt fence along a slope. At a minimum, one row of silt fence should be placed mid-slope and another at the toe of the slope. For example, an 80 foot slope at 3:1 should have 2 rows of silt fence spaced 40 feet apart. Slopes with lengths less than the approximate spacing listed in Table 1 do not need silt fence.

Table 1: Guidelines for silt fence spacing on slopes.

Slope	Approximate spacing (ft)*
up to 10:1 (10%)	100
up to 5:1 (20%)	60
up to 4:1 (25%)	50
up to 3:1 (33%)	40
up to 2.5:1 (40%)	30

*For Loess and other highly erodible soils, these spacings should be decreased.

Information Source: Based on information in Iowa Construction Site Erosion Control Manual, 2006.

Standard Road Plan [EC-201](#) shows details for silt fences.

Use Tab. [100-17](#) to list silt fence locations.

Silt Fence Bid Quantities

Grading Projects

Silt Fence

Bid quantity = tab quantity × 1.25. The bid quantity should be 25% more than the tab quantity to reflect possible replacements during the grading.

Include the following bid item Estimate Reference Note:

Refer to Tab. [100-17](#). The tabulation includes estimated locations for placement of Silt Fence to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes 25% additional quantity for field adjustments and replacements.

Maintenance of Silt Fence or Silt Fence for Ditch Check

Bid quantity = (silt fence bid quantity + silt fence for ditch check bid quantity) × 0.10. The bid quantity is equal to 10% of the bid quantities for silt fence and silt fence for ditch checks.

Include the following bid item Estimate Reference Note:

This item is included for cleanout and repair of the silt fence and silt fence for ditch checks during the project.

Removal of Silt Fence or Silt Fence for Ditch Check

Bid quantity = (silt fence bid quantity + silt fence for ditch check bid quantity) × 0.5. The bid quantity should be 50% of the bid quantities for silt fence and silt fence for ditch checks for staged projects.

Include the following bid item Estimate Reference Note:

This item is included for silt fence and silt fence for ditch check removal required for staging reasons, for replacement (replacement to be paid separately), or for areas that have achieved 70% permanent growth.

Paving Projects

Silt Fence

Bid quantity = new locations + grading tab quantity × 0.10. The bid quantity should include the new locations for the paving project plus 10% of the grading project tab quantity.

Include the following bid item Estimate Reference Note:

Refer to Tab. [100-17](#). The tabulation includes estimated locations for placement of Silt Fence to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes tab quantity for the paving

project for new locations and 10% of the original tab quantity for the grading project (insert original tab quantity from the grading project) for field adjustments and replacements.

Maintenance of Silt Fence or Silt Fence for Ditch Check

Bid quantity = (new locations + grading bid quantities) × 0.10. The bid quantity should be 10% of the new locations for the paving project and the bid quantities for silt fence and silt fence for ditch checks installed on the grading project.

Include the following bid item Estimate Reference Note:

This item is included for maintaining the new silt fence and silt fence ditch checks installed for the paving project and existing silt fence and silt fence for ditch checks installed as part of the grading project.

Removal of Silt Fence or Silt Fence for Ditch Check

Bid quantity = (new locations + grading bid quantities) × 0.10. The bid quantity should be 10% of the new locations for the paving project and the bid quantities for silt fence and silt fence for ditch checks installed on the grading project.

Include the following bid item Estimate Reference Note:

This item is included for silt fence and silt fence for ditch check removal required for staging reasons, for replacement (replacement to be paid separately), or for areas that have achieved 70% permanent growth.

Grade and Pave Projects

One year and two year construction season projects should be treated like a grading project (except as noted below).

Removal of Silt Fence or Silt Fence for Ditch Check

Include 100% of silt fence and silt fence for ditch check bid quantities for projects with permanent seeding. Include 50% of silt fence and silt fence for ditch check bid quantities for staged projects (projects that are broken into grading only, paving only, etc.).

Include the following bid item Estimate Reference Note:

This item is included for silt fence and silt fence for ditch check removal required for staging reasons, for replacement (replacement to be paid separately), or for areas that have achieved 70% permanent growth.

An additional mobilization will be needed for the paving portion of the project if one of the items listed in Section [1G-5](#) is included for the paving portion the project.

Bridge and RCB Projects

Whether a stand-alone project or as part of a grading project, treat like a grading project (except as noted below).

Removal of Silt Fence or Silt Fence for Ditch Check

The bid quantity should be 100% of silt fence and silt fence for ditch check bid quantities for projects with permanent seeding. For staged projects (projects that are broken into grading only, paving only, etc.), bid quantity should be 50% of silt fence and silt fence for ditch check bid quantities for staged projects.

Include the following bid item Estimate Reference Note:

This item is included for silt fence and silt fence for ditch check removal required for staging reasons, for replacement (replacement to be paid separately), or for areas that have achieved 70% permanent growth.

Silt Fence for Ditch Checks

Silt fence ditch checks are used to slow flow of water and to intercept soil and debris from water flowing through ditches. They are installed at right angles to the flow of water. Follow the spacing guidelines in Table 2 when placing silt fence ditch checks.

Table 2: Guidelines for silt fence ditch check spacing.

ditch grade	approximate spacing (ft)
≤ 0.5%	315
> 0.5% to ≤ 1%	155
> 1% to ≤ 1.5%	100
> 1.5% to ≤ 2%	75
> 2% to ≤ 2.5%	60
> 2.5% to ≤ 3%	50
> 3% to ≤ 3.5%	45
> 3.5% to ≤ 4%	40
> 4% to ≤ 5%	35
> 5% to ≤ 5.5%	30
> 5.5% to < 6%	25
≥ 6%	Special design required – contact Roadside Development in the Office of Design

Standard Road Plan [EC-201](#) shows details for silt fence ditch checks.

Use Tab. [100-18](#) for location and storage volume of silt fence ditch checks.

Silt Fence for Ditch Check Bid Quantities

Grading Projects

Silt Fence for Ditch Checks

Bid quantity = tab quantity × 1.50. The bid quantity should be 50% more than the tab quantity to reflect possible replacements during the grading project.

Include the following bid item Estimate Reference Note:

Refer to Tab. [100-18](#). The tabulation includes estimated locations for placement of Silt Fence for Ditch Checks to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes 50% additional quantity for field adjustments and replacements.

Maintenance of Silt Fence or Silt Fence for Ditch Check

Refer to [Silt Fence Bid Quantities](#) above.

Removal of Silt Fence or Silt Fence for Ditch Check

Refer to [Silt Fence Bid Quantities](#) above.

Paving Projects

Silt Fence for Ditch Checks

Bid quantity = new locations + grading tab quantity × 0.10. The bid quantity should include the new locations for the paving project plus 10% of the grading project tab quantity.

Include the following bid item Estimate Reference Note:

Refer to Tab. [100-18](#). The tabulation includes estimated locations for placement of Silt Fence for Ditch Checks to address possible erosion during construction. Verify the specific locations with the Engineer prior to beginning placement. Bid item includes tab quantities for the paving project for new locations and 10% of the original tab quantity for the grading project (insert original tab quantity from the grading project) for field adjustments and replacements.

Maintenance of Silt Fence or Silt Fence for Ditch Check

Refer to [Silt Fence Bid Quantities](#) above.

Removal of Silt Fence or Silt Fence for Ditch Check

Refer to [Silt Fence Bid Quantities](#) above. An additional mobilization will be needed if one of the items listed in Section [1G-5](#) is included in the project.

Grade and Pave Projects

One year and two year construction season projects should be treated like a grading project.

Bridge and RCB Projects

Whether a stand-alone project or as part of a grading project, treat like a grading project.

Rock Check Dams

Similar to silt fence ditch checks, rock check dams are used to slow flow of water and to intercept soil and debris from water flowing through ditches. They are installed at right angles to the flow of water. Typically, they are installed in situations where silt fence ditch checks have failed to hold up. For this situation, the quantity bid is based on a percentage of Silt Fence for Ditch Check.

Should the Roadside Development Section specifically request the use of rock check dams for storm water storage purposes, follow the spacing guidelines in Table 3.

Note: Rock check dams cannot be used within the construction clear zone. Refer to the Clear Zone Distances for Temporary Traffic Control Zones section in Section [8A-2](#) for information related to construction clear zone.

Table 3: Guidelines for rock check dam spacing.

ditch grade	approximate spacing (ft)
≤ 0.5%	400
> 0.5% to ≤ 1%	200
> 1% to ≤ 1.5%	130
> 1.5% to ≤ 2%	100
> 2% to ≤ 2.5%	80
> 2.5% to ≤ 3%	65
> 3% to ≤ 3.5%	55
> 3.5% to ≤ 4%	50
> 4% to ≤ 4.5%	45
> 4.5% to ≤ 5%	40
> 5% to ≤ 5.5%	35
> 5.5% to ≤ 6.5%	30
> 6.5% to ≤ 8%	25
> 8% to ≤ 10%	20
> 10%	Special design – contact Roadside Development in the Office of Design

Typical [570-2](#) shows details for rock check dams.

Use Tab. [100-32](#) for location and storage volume of rock check dams.

Rock Check Dam Bid Quantities

Used to Replace Silt Fence Ditch Check

Grading Projects

Rock Check Dam

Bid quantity = bid quantity for Silt Fence for Ditch Checks \times 0.1. The bid quantity should be 10% of the bid quantity of Silt Fence for Ditch Checks to reflect possible replacement for Silt Fence for Ditch Checks during the grading project.

Maintenance of Rock Check Dam

Assume 3 cleanouts for each rock check dam. Installation of rock check dam is paid in linear feet; however, maintenance is paid per occurrence. This requires converting linear feet of rock check dam bid to a number of rock check dams maintained. To make the conversion, assume each rock check dam is 16 linear feet. Divide the linear feet bid by 16 feet per rock check dam and round up to get the equivalent number of rock check dams.

As an example, suppose 9,000 feet of Silt Fence for Ditch Check is bid for a drainage basin. Then the bid quantity for Rock Check Dam is 0.1×9000 feet = 900 feet. This converts to $900/16 = 57$ (after rounding up) rock check dams.

Removal of Rock Check Dam

Refer to Maintenance of Rock Check Dam Quantities above to estimate the number of rock check dams to be removed.

Paving Projects

Rock Check Dam

Bid quantity = bid quantity for Silt Fence for Ditch Checks \times 0.1. The bid quantity should be 10% of the tab quantity of Silt Fence for Ditch Checks to reflect possible replacement for Silt Fence for Ditch Checks during the grading project.

Maintenance of Rock Check Dam

Assume 3 cleanouts for each rock check dam. Installation of rock check dam is paid in linear feet; however, maintenance is paid per occurrence. This requires converting linear feet of rock check dam installed to a number of rock check dams maintained. To make the conversion, assume each rock check dam is 16 linear feet. Divide the linear feet of installation by 16 feet per rock check dam and round up to get the equivalent number of rock check dams.

Removal of Rock Check Dam

Refer to Maintenance of Rock Check Dam Quantities above to determine the number of rock check dams to be removed.

Grade and Pave Projects

One year and two year construction season projects should be treated like a grading project.

Bridge and RCB Projects

Whether a stand-alone project or as part of a grading project, treat like a grading project.

Used for Storm Water Storage

Rock Check Dam

Rock check dams are bid by linear feet. The bid item includes the revetment, Class 10 excavation, and engineering fabric required to construct rock check dams.

Maintenance of Rock Check Dam

Assume 3 cleanouts for each rock check dam.

Removal of Rock Check Dam

Include 1 removal for each rock check dam installed.

Temporary Sediment Control Basins

Temporary sediment control basins are used to capture sediment before it leaves the right of way. They are required for drainage basins which involve 10 or more acres of disturbed area. Disturbed areas are areas where vegetation, rocks, pavement and other protective ground covers are removed during construction resulting in the exposure of underlying soil. Temporary sediment control basin structures are larger than other temporary sediment control devices and are intended to detain more storm water. They include a pipe, the intent of which is to release water from the top of the pond first to allow sediment to settle out. They also include a rock spillway to reduce likelihood of the structure washing out.

Typical [570-3](#) shows details for temporary sediment control basins.

Use Tab. [100-33](#) for location and storage volume of temporary sediment control basins.

Temporary Sediment Control Basin Bid Quantities**Temporary Sediment Control Basin**

Temporary sediment control basins are bid by count. The bid item includes the materials and labor to construct them.

Maintenance of Temporary Sediment Control Basin

Assume 3 cleanouts for each temporary sediment control basin.

Removal of Temporary Sediment Control Basin

Include 1 removal for each temporary sediment control basin installed.

Perimeter and Slope Sediment Control Devices

Perimeter and Slope Sediment Control Devices are used for a purpose similar that of silt fence – to capture sediment or to slow flow of water. However, the use of these devices is much more flexible than silt fence. For example, this type of control may be installed when weather or site conditions do not permit installation of silt fence, or when it is preferred, as a result of the contractor's staging, to install a control that can be easily removed and replaced. Because of this flexibility, placement of these controls is difficult to determine during design.

Perimeter and Slope Sediment Control Device Bid Quantities

Where perimeter and slope sediment control devices are used in lieu of silt fence, and specific locations have been determined, use the guidelines in Table 1 and Table 2 for estimating purposes. Use 12 inch devices for slopes/grades less than 33% and use 20 inch devices for slopes/grades equal to or greater than 33%.

Note: Perimeter logs are sold in 10 foot increments, so estimates should be rounded up to the next 10 foot increment.

If specific locations for perimeter and slope sediment control devices haven't been determined, then for estimating purposes include the greater of:

- A minimum of 200 feet each of 12 inch and 20 inch perimeter and slope sediment control devices or
- 10% of the silt fence quantities up to a maximum of 1,000 feet each of 12 inch and 20 inch perimeter and slope sediment control devices.

Some specific locations where use of Perimeter and Slope Sediment Control Devices is ideal include:

- Slopes which are pitched towards the roadway and end at the back of curb or along a sidewalk.
- Inlet protection, such as on guardrail projects to protect inlets of median pipes. Quantity should be based on the number of inlets to be protected.
- RCB or Bridge Projects. Estimated quantity for 12 inch or 20 inch devices would be the length of stream from ROW line to ROW line. If work is being done on both sides of the stream, the quantity would be doubled.

Removal of Perimeter and Slope Sediment Control Devices is bid in the same manner as installation.

Silt Curtains

Include the Developmental Specifications for Floating Silt Curtain as well as [EC-202](#), which shows installation of hanging and containment silt curtains.

Floating Silt Curtain (Hanging)

Use for soil disturbing operations in or adjacent to a body of water and when requested by the ADE.

Estimate quantities based upon the width from ROW to ROW or width from ROW to ROW plus easements (whichever is greater) at the location. For bridges, use 2x the ROW to ROW (or ROW to ROW plus easement) width when both berms are impacted or 1x the width if only one berm is affected. The main point is to have a bid item and a reasonable quantity in the plans for the field to work with, so there is no need to be overly precise.

Note: Floating silt curtain is supplied in 50 foot lengths, so estimates should be rounded up to the next 50 foot increment (though not all 50 feet needs to be installed in the water – some of the curtain may be placed on the bank).

Cleanout is not required and removal is incidental to installation.

A temporary stream diversion ([EW-402](#)) is typically included with culvert projects instead of floating silt curtain.

Floating Silt Curtain (Containment)

Use when specified by the Office of Location and Environment or when requested by the ADE. It is intended for sensitive areas, protected waters, and where endangered aquatic species are expected to exist. When this item is used, it is installed parallel to the Hanging curtain and both bid items will be used.

Estimated quantities for Floating Silt Curtain (Containment) are the same as used for Hanging. For example, if you have 200 LF of Hanging and OLE says to use Containment also, then you will also have 200 LF of Containment. Include the Clean-out of Floating Silt Curtain (Containment) bid item. The clean-out quantity will be 2x the Floating Silt Curtain (Containment) quantity, as it includes one interim cleanout plus removal. The removal is paid for as one cleanout since the curtain has to be removed to clean it out.

Examples

1. Bridge Project

ROW is 150 feet. Work is on both sides of the stream. Containment is not specified by OLE. Bid as follows:

- Floating Silt Curtain (Hanging) = $150 \times 2 = 300$ feet.

2. ER Project

ROW is 100 feet. Only one bank is disturbed. Not directed to use Containment. Bid as follows:

- Floating Silt Curtain (Hanging) = $100 \times 1 = 100$ feet.

Maintenance of Floating Silt Curtain (Hanging or Containment)

Bid quantity = Floating Silt Curtain \times 0.50. The bid quantity is equal to 50% of the tab quantities for Floating Silt Curtain.

Best Management Practices (BMPs) for erosion and sediment control measures are required throughout the site and immediately uphill of the curtains to minimize sediment migration to the curtains.

Other Criteria when Determining Controls or Bid Quantities

Soil conditions, such as erodibility, should be considered when choosing a sediment control device. For example, sands and silts erode quickly, but clays are more stable. Highly erodible soils may require more devices with a closer spacing than more stable soils. Design decisions should be made on the field exam. For assistance in design or for more information, contact Roadside Development.

On paving projects where sediment control devices have already been installed on the grading project, it is the intent that these be maintained in functional condition during the paving contract. A certain percentage of the original quantity of sediment control devices from the grading project is included on the paving project to account for the reconstruction of the existing devices that are no longer functional (see Bid Quantities of corresponding sediment control device). A tabulation of sediment control devices from the grading project should not be included in the paving project. Instead, include a note in the bid items to distinguish this quantity. The paving project may also have locations of new devices exclusive to the paving project to be included in the bid items. Once again the quantities depend on the existing conditions of the project.

Stabilized Construction Entrance

Stabilized construction entrances are temporary entrances consisting of a layer of aggregate placed on a mat of engineering fabric. The purpose of stabilized construction entrances is to reduce mud tracked on to the roadway, so they should be located at points where construction traffic leaves a construction site and enters on to a public road. Construction staging affects where contractors will enter a roadway. This makes determining the location and number of stabilized construction entrances difficult to determine, so for estimating purposes, assume the following:

- For grading or grade and pave projects: 1 entrance at the start of the project, 1 entrance at the end of the project, 2 for each leg of a side road used to access a project, and 1 per structure (bridge or box culvert), if included with grading or paving project.
- Each entrance will be 100 linear feet.
- For stand-alone structures project: 2 entrances.

As an example, for a grade and pave project with 3 side road legs used for access and 2 structures:

$$\begin{aligned} \text{Number of entrances} &= 1 \text{ at the start} + 1 \text{ at the end} + 6 \text{ for the side road legs} + 2 \text{ for the structures} \\ &= 10 \text{ entrances} \end{aligned}$$

$$\begin{aligned} \text{Linear feet of Stabilized Construction Entrance} &= 10 \text{ entrances} \times 100 \text{ linear feet per entrance} \\ &= 1,000 \text{ linear feet} \end{aligned}$$

Pollution Prevention Plans – Stormwater Permit

Include a Pollution Prevention Plan (PPP) in all projects involving a disturbed area of one acre or more. As mentioned above, a disturbed area is an area where vegetation, rocks, pavement and other protective ground covers are removed during construction resulting in the exposure of underlying soil. The same PPP must appear in all plans that occur within a permit's limits. Therefore, when covered under a single permit, if a PPP is developed for a grading project, the same PPP must appear in all related plans for paving, culverts, bridges, lighting, erosion control, etc. This means even if a bridge or RCB project within the permit limits involves less than an acre of disturbance, it is covered under the permit and therefore must contain a PPP. See Section [10D-1](#) for more information.

Chronology of Changes to Design Manual Section:

010C-001 Temporary Sediment Control Devices

- | | |
|-----------|---|
| 1/7/2016 | Revised
Revised silt fence ditch check spacing in Table 2. Removed information on page 7 regarding use of floating silt curtain (hanging) for use with culverts. Changed silt fence maintenance and removal bid quantities to be based on installation bid quantities. |
| 7/22/2014 | Revised
Added Quick Tips. Added link to Erosion and Sediment Control Field Guide. Added additional information regarding use of floating silt curtain (hanging) and bidding Maintenance of Floating Silt Curtain. Added information regarding silt basin use. Added information for Removal of Silt Basin, Removal of Slope and Sediment Control Devices, and Removal of Perimeter and Slope Control Devices. Created summary table for erosion control bid items. |
| 2/10/2012 | Revised
Updated Standard Numbers |

CHAPTER 7 EROSION & SEDIMENT CONTROL

7.00 GENERAL INSPECTION

Inspection personnel assigned to erosion control work should review project plans, specifications, special provisions, and road standards pertaining to erosion control. The right-of-way contracts should be reviewed for special treated areas not mentioned on the plans. For seeding, fertilizing, and mulching, a pre-measurement using slope distances of the project is needed before the contractor starts. Both the contractor and inspector need to know the quantities of seed, fertilizer, and mulch required on the project.

Attention should be given to the erosion control plan and proposal notes for the special items and conditions involved with each individual project. This will include seed mixtures, seed variety, fertilizer type and rate, and required watering.

Material delivered to the project and damaged due to improper storage or handling should be rejected, even though it may have been previously accepted.

Specification 4169 should be referred to for material requirements.

The testing requirements for seed and fertilizer are outlined in *Materials I.M. 469.02 and 469.03*.

The inspector is to observe the application of seed, fertilizer, and mulch.

Record the quantities of these materials used in the project records.

Witnessing the mixing of seed for Native Grass, Wildflower and Wetland Grass seeding mixtures is no longer required by the specifications. Instead, these mixes and urban and permanent rural seed mixes shall be mixed off-site by a seed conditioner approved by the Iowa Crop Improvement Association or other state's crop improvement association.

All revisions made to the seed mixtures, fertilizer, or rate of fertilizer should be approved by the Office of Construction or the Office of Design (Roadside Development Section).

7.01 EQUIPMENT

Proper equipment in good working condition and operated at a reasonable speed must be used to get the best results. Where possible, the equipment should be operated on the contour or parallel to the slope.

Equipment for preparation of the seedbed includes a disc, cultipacker, spike tooth harrow, spring tooth harrow, slope harrow, and a rotary tiller. Other equipment may be approved for use provided that it achieves the desired results.

A heavy disc, such as a Rome disc, may be required in areas of heavy vegetation. A slope harrow may be required in areas of light soil, where equipment tracks damage the appearance of the seedbed.

Equipment for applying seed and fertilizer consists of a hydro-seeder, gravity seeder, end gate cyclone seeder, cyclone seeder, and a seed drill. The cyclone seeder (hand seeder) is usually used to spread seed and fertilizer in small areas or areas inaccessible to field equipment. If allowed by the contract documents, aerial equipment may be used for the application of seed and fertilizer. Contract documents may also specify where seeding must be done with a seed drill with a no-till attachment.

Equipment should be checked for proper rate of application of seed and fertilizer by measuring a representative area and weighing the required amount of seed to be applied. All seeders must be cleaned when changing seed mixtures, particularly when changing from rural seeding to urban seeding.

7.02 CONTRACT ADMINISTRATION

Both the project engineer and the inspector should review the construction period shown on the proposal form. On most projects, the contract will have a late start date with a specified number of work days.

For overseeding, the work is to be done during February and March when the soil is friable from frost action. Working days are not to be charged until April 1, unless winter work is required in the contract documents.

The placement of special ditch control for the spring planting period should be done as soon as weather and soil will allow. After April 1, working days should be charged whenever it is possible to perform the controlling operation.

7.10 PERMANENT EROSION CONTROL

The normal periods for permanent urban and rural seeding are from March 1 to May 31 and from August 10 to September 30. Native and wetland grass seeding dates are between April 1 through May 31 and November 1 until ground conditions are unsuitable for seeding due to moisture or frost. Wildflower seeding dates are between April 15 and June 30. Spring overseeding is typically performed after February 1 and before April 1. Refer to *Construction Manual Section 7.16* for more information on overseeding.

These dates may be modified by the Office of Construction and Materials or the Office of Design (Roadside Development Section). Changes in the dates will be based on temperature and moisture conditions and possibly specific project considerations.

Seeding date extension notices will be posted on the Office of Construction and Materials website:

http://www.iowadot.gov/Construction_Materials/earthwork.html

7.11 PREPARATION OF SEEDBED

Before seeding operations commence, care should be taken to properly prepare the area to be seeded. Areas around culvert headwalls and wingwalls, shoulders, flumes, sign posts, and other structures require special attention. The seedbed shall be worked to a depth of at least 3 inches deep with field machinery and at least 2 inches deep in locations prepared by hand. The specifications require certain areas such as raised medians, islands, and rest areas to be prepared with a Rototiller.

All debris, including stones 3 inches in diameter and larger, logs, stumps, wire, and other objectionable material shall be picked up and disposed of off the project.

If the project has been stabilized with temporary seeding, the plans will usually include mowing as a contract item. In this case, the mowing will be accomplished prior to seeding the permanent seed with a native grass seed drill with a no till attachment.

7.12 PREPARATION OF SEED MIXTURE

Seed

Permanent rural, permanent urban, urban stabilizing, Native Grass, Wetland Grass, and Wildflower seeding mixtures are required to be mixed off-site by a seed conditioner approved by ICIA or other state's Crop Improvement Association. For more information on the seed conditioner program, refer to ICIA website:

http://www.iowacrop.org/Seed_Directory.htm

Mechanically printed seed tags and the seed mixture reports should be checked to verify that it complies with minimum purity and germination requirements, current test data, and variety. The date of the germination test should be checked also. The specifications, based on the Iowa Department of Agriculture regulations, require that the test date be within a 9 month period exclusive of the calendar month in which the test was completed. For example, seed tested 8/5/12 shall be applied by 5/31/13. If seed is to be applied after 5/31/13, then seed requires a new test.

If the test information indicates noncompliance for purity and germination requirements, the seed may be used on a pure live seed (PLS) basis providing:

- Seed meeting the requirements cannot be obtained, and
- The seed meets the approval of the project engineer.

For each seed variety or mix, remove and retain at least one seed tag per day of seeding.

When seed is used on a pure live seed basis (PLS), the quantity required must be calculated from test results. If the project requires 10 pounds of Switchgrass PLS per acre, and the tag rated the furnished seed at 98% purity and 95% germination, the pure live seed is computed as follows:

Purity = 98% = 0.98
Germination = 95% = 0.95

PLS (Pure Live Seed) = Purity X Germination
= 0.98 X 0.95
= 0.93 = 93% PLS

To calculate the number of kilograms (pounds) of seed required to provide 10 pounds PLS:

10 pounds / 0.93 = 10.75 pounds of seed per acre

Sticking Agent

Seed to be inoculated shall be treated with a sticking agent prior to the application of the inoculant. A sticking agent is not required with liquid inoculant.

Inoculant

An inoculant is required for legume seed. An inoculant is a culture of bacteria specifically formulated to enhance the growth of the seed. The inoculant shall be a type recommended by the manufacturer and applied at the rate according to our specifications.

Red clover is an example of a legume that was previously specified in stabilizing crop seeding.

Rural Stabilizing Seed Mixtures

Each bag shall have seed tags for each species of grass with all of the required information, seed test date, and specified seeding rate percentages.

For example:

Oat	47.5%
Grain Rye	46.5%
Canada wildrye	4.8%
Other	1.2%

A 50 pound bag of mixed seed would contain 23.75 pounds of Oat, 23.25 pounds of Grain rye, and 2.4 pounds of Canada wildrye.

The tag or the seed mixture reports should also include the project number, type and rate of preinoculant (if required), and date of mixing.

The Department is not obligated to purchase remaining amounts of premixed seed as "unincorporated material."

7.13 CONVENTIONAL SEEDING

The following suggested sequence of operations is for permanent seeding with a gravity or cyclone seeder when a prepared seedbed is required:

1. Prepare seedbed and ditches
2. Spread fertilizer
3. Disc in fertilizer approximately 3 inches
4. Roll with cultipacker
5. Apply seed for special ditch control and slope protection
6. Apply special ditch control and slope protection material
7. Apply grass and legume seed
8. Roll with cultipacker
9. Apply mulch
10. Till (tuck) mulch with a mulch anchoring equipment

Note: Items 5 & 6 may be placed after Item 8

7.14 HYDRO-SEEDING (HYDRAULIC SEEDING)

The suggested sequence of operations using a hydro-seeder is:

1. Prepare seedbed and ditches
2. Apply seed for special ditch control and slope protection
3. Apply special ditch control and slope protection material
4. Apply fertilizer, seed, inoculant, and water with hydro-seeder
5. Roll with cultipacker
6. Place mulch where specified
7. Till mulch with mulch anchoring equipment (step not required if hydro-mulch is used)

Note: Items 2 & 3 may be placed following Item 5

The following items should be noted when inspecting hydro-seeding:

A fanning motion or horizontal motion of the seeding nozzle insures uniform application of the seed. Do not use an "up and down" motion; it results in seed application too heavy near the seeder and too thin at the far reach of the spray.

The seeder tank must be cleaned when changing seed mixtures.

The agitator in the seeder tank must be in operation for a period of time prior to starting the seeding to insure mixing of the material in the tank. After mixing and during application of material, a continuous operation with a constant pressure must be maintained during the seeding.

The contractor should apply the mixture of water, seed, and fertilizer with the wind, if possible. The contractor should try to prevent mist from blowing across the roadway if open to traffic.

The seed may be in the fertilizer solution for no more than one hour.

If hydraulic mulching is used with hydraulic seeding, they must be performed as separate operations. To keep seed from floating to the top in the equipment during hydraulic seeding, a bag of hydraulic mulch may be added to the seed. However, this bag will not be included as part of the required mulching rate (minimum 3,000 pounds per acre).

7.15 URBAN SEEDING

The suggested sequence for seeding in urban areas is:

1. Apply fertilizer. Unless otherwise impractical, fertilizer should be applied with hand-operated, gravity or cyclone type equipment.
2. Prepare seedbed using a rototiller
3. Roll with grid-type roller. The roller must be the open-grid type or a cultipacker covered with expanded metal mesh. Brillion seeding equipment provides a roller in front and behind the seed hopper.
4. Apply seed
5. Roll with grid-type roller
6. Apply hydro-mulch (Note: Straw is typically not used in urban situations)

7.16 OVERSEEDING

Spring overseeding or "frost overseeding" is the application of permanent seed without preparing a seedbed. Spring overseeding is performed normally in February or March, but may be modified depending on the weather conditions.

The following guidelines should be used to determine when spring overseeding is allowed:

- Ground is relatively free of packed snow and ice.
- Light snow cover of not more than 1 inch.
- The project may be free of snow and ice with the exception of a few ditches or slope areas. It would be permissible to allow the overseeding with the stipulation that the contractor would reapply the seed on those designated ditches or slopes as soon as the snow and ice have melted.

The application of seed when the ground is loose and friable from frost action provides a favorable condition for the earliest possible seed establishment. The application of seed prior to this ideal condition is more favored than after the ground is free of frost and dry. Seed applied when the ground is frozen is not generally detrimental. The loss of seed due to runoff, in the event of heavy spring rains or snow melt, should be minor.

7.17 OVERSEEDING AND FERTILIZING

The following is a recommended schedule of payment for the item of "Overseeding and Fertilizing:"

- 50% at the completion of the overseeding
- 30% after the completion of the first application of fertilizer
- 20% after the final application of fertilizer

7.18 AERIAL SEEDING

Aerial seeding is only allowed when specified in the contract documents. The distribution of seed on the ground should be checked during the aerial seeding operation. If a significant amount of seed falls onto the roadway shoulders or off of the right-of-way, the seeding operation should be halted and corrective action taken. For aerial application, the wind velocity should be less than 10 mph.

As a guide, the following is a part of the Beaufort Scale for wind velocity:

Type	Observations	Speed (mph)
Calm	Calm. Smoke rises vertically.	(0-1)

Light air	Direction of wind shown by smoke drift but not by wind vanes.	(1-3)
Light breeze	Wind felt on face. Leaves rustle. Ordinary vane moved by wind.	(4-7)
Gentle breeze	Leaves and small twigs in constant motion. Wind extends light flags.	(8-12)
Moderate breeze	Raises dust and loose paper. Small branches are moved.	(13-18)
Fresh breeze	Small trees with leaves begin to sway. Crested wavelets form on inland waters.	(18-24)

A subcontract request form is not required for the aerial applicator (airplane or helicopter), which is usually owner-operated.

Guidelines to allow/disallow use of local roads for takeoff and landing of planes which seed areas on primary projects are:

- Primary roads or local roads designated as detours shall not be used for takeoff/landing
- Takeoff/landing should be with written permission of the county engineer or local agency and with traffic control and signing as required by the owner of the road
- The owner of the road may, at their discretion, ask the applicator for:
 - A "waive and hold harmless" agreement to reduce liability
 - Proof of insurance
- Federal Aviation Regulations (FAR) are listed in Title 14 of the U.S. Code of Federal Regulations. They are available to view at Web address:
https://www.faa.gov/regulations_policies/faa_regulations/

Applicable regulations are "FAR Part 91 – General Operating and Flight Rules" and "FAR Part 137 – Agricultural Aircraft Operations".

7.20 FERTILIZER

Fertilizer shall include the following information on the bag ticket or manufacturer's invoice:

- net weight
- name of the manufacturer and/or distributor
- guaranteed analysis of the fertilizer

These should be checked by the inspector in order to insure correct fertilizer grade and amount. "Fertilizer Grade" refers to the percentages of nitrogen (N), phosphoric acid (P_2O_5) and potassium (K_2O) present. The contractor must furnish a list of the number of containers and a corresponding weight ticket from an approved scale for fertilizer used in the work.

Fertilizer spilled on the ground shall be promptly cleaned up in accordance with *Iowa Administrative Rule 21-44.57(4)*.

7.21 EXAMPLE CALCULATIONS -**A. CHEMICALLY COMBINED FERTILIZER**

(Note that the examples are in English units only.)

Example No. 1

Specified: 500 pounds of 12-12-12 chemically combined commercial fertilizer per acre. The contractor may furnish an equivalent grade such as 10-10-10, 13-13-13, 14-14-14, 15-15-15, 16-16-16, etc., chemically combined fertilizer. The nutrients in the above grades of fertilizer are of the same ratio (1-1-1).

To calculate the pounds of 13-13-13 fertilizer needed to provide the plant nutrients specified for 500 lbs. of 12-12-12, divide the percent of the required analysis by the percent of the furnished analysis for the same nutrient.

$$\frac{500 \text{ lbs.} \times 12\% \text{ required}}{13\% \text{ furnished}} = \frac{500 (12)}{13} = 462 \text{ lbs. per acre}$$

Therefore, 462 lbs. of 13-13-13 is equivalent to 500 lbs. of 12-12-12.

If hydro-seeder is used, the contractor may furnish each nutrient as a separate material or use two or more chemically combined nutrients.

Example No. 2

Specified: 500 lbs. of 12-12-12 per acre. The contractor may furnish the following fertilizer grades to meet the nutrient requirements: 30-10-0, 16-48-0, and 0-0-60.

- 1) Compute the lbs. of each nutrient required per acre:

$$500 \text{ lbs.} \times 12\% \text{ (N)} = 60 \text{ lbs. N}$$

$$500 \text{ lbs.} \times 12\% \text{ (P}_2\text{O}_5\text{)} = 60 \text{ lbs. P}_2\text{O}_5$$

$$500 \text{ lbs.} \times 12\% \text{ (K}_2\text{O)} = 60 \text{ lbs. K}_2\text{O}$$

- 2) Compute the lbs. of 0-0-60 needed to furnish 60 lbs. of K_2O :

$$\frac{60}{60\%} = \frac{60}{.60} = 100 \text{ lbs. of 0-0-60}$$

$$60\% \quad .60$$

- 3) Compute the lbs. of 30-10-0 and the lbs. of 16-48-0 needed to furnish 60 lbs. of N and 60 lbs. of P_2O_5 :
- X = 30-10-0 component Y = 16-48-0 component
- a) $N = .30X + .16Y = 60$
 $P_2O_5 = .10X + .48Y = 60$
- b) Solve equations in (a) simultaneously
 $30 (.30X) + 30 (.16Y) = (30) (60)$
 $9X + 4.8Y = 1800$
- c) $10 (.10X) + 10 (.48Y) = (10) (60)$
 $1X + 4.8Y = 600$
- d) Subtract equation (c) from equation (b) and solve for X.
- $$\begin{array}{r} (9X + 4.8Y) = 1800 \\ - (1X + 4.8Y) = 600 \\ \hline 8X \qquad \qquad = 1200 \\ X \qquad \qquad \quad = 150 \text{ lbs.} \end{array}$$
- e) Substitute X into 1st equation in (a) and solve for Y.
- $$\begin{array}{l} .30X + .16Y = 60 \\ (.30) (150) + .16Y = 60 \\ 45 + .16Y = 60 \\ .16Y = 60 - 45 \\ .16Y = 15 \\ Y = 93.7 \text{ (or 94 lbs.)} \end{array}$$
- 4) 150 lbs. of 30-10-0 per acre
94 lbs. of 16-48-0 per acre
100 lbs. of 0-0-60 per acre

The above quantities supply the nutrient requirements per acre.

B. COLD BLENDED FERTILIZER

Since cold blended fertilizer is now allowed and can be a combination of different ingredients, let's try to understand the basic information first and then perform some calculations to determine if the contractor has brought enough for what is expected. Again, the overall cold blended fertilizer can be from separate ingredients such as Diammonium Phosphate (DAP), Monoammonium Phosphate (MAP), Muriate of Potash, and/or urea. Thus, one needs to understand: (1) what is required; (2) what is in these ingredients; and (3) how much of each ingredient is needed to meet the overall requirements.

Example No. 1

The plan requires 100 pounds of 6-24-24 fertilizer per acre.

The required fertilizer means the fertilizer must have at least:

- 6 pounds of nitrogen (N)
- 24 pounds of phosphoric acid (P_2O_5)
- 24 pounds of potassium (K_2O).

The fertilizer that is brought to the site is a cold mix with DAP and Potash. The DAP by itself is 18-46-0 and the Potash by itself is 0-0-60. The ticket indicates that there are 52.2 pounds of DAP and 40 pounds of Potash per acre for this cold blend.

From the 52.2 pounds of DAP (18-46-0) the amount of nitrogen (N), phosphoric acid (P_2O_5) and potassium (K_2O) can be calculated as follows:

Nitrogen: $52.2 \text{ pounds} \times 18/100 = 9.4 \text{ pounds}$
Phosphoric acid: $52.2 \text{ pounds} \times 46/100 = 24.0 \text{ pounds}$
Potassium: $52.2 \text{ pounds} \times 0/100 = 0.0 \text{ pound}$

From the 40 pounds of Potash (0-0-60) the amount of nitrogen (N), phosphoric acid (P_2O_5) and potassium (K_2O) can be calculated as follows:

Nitrogen: $40.0 \text{ pounds} \times 0/100 = 0.0 \text{ pound}$
Phosphoric acid: $40.0 \text{ pounds} \times 0/100 = 0.0 \text{ pound}$
Potassium: $40.0 \text{ pounds} \times 60/100 = 24.0 \text{ pounds}$

Thus, by combining these two products, the overall amounts for nitrogen (N), phosphoric acid (P_2O_5) and potassium (K_2O) are:

Nitrogen (N): $9.4 \text{ pounds} + 0.0 \text{ pound} = 9.4 \text{ pounds}$
Phosphoric acid (P_2O_5): $24.0 \text{ pounds} + 0.0 \text{ pound} = 24.0 \text{ pounds}$
Potassium (K_2O): $0.0 \text{ pound} + 24.0 \text{ pounds} = 24.0 \text{ pounds}$

This verifies that the provided 92.2 (or $52.2 + 40$) pounds of cold blended fertilizer exceeds the requirement per acre.

Example No. 2

From Example No. 1, let's go one step further. The plan actually requires 500 pounds of 6-24-24 fertilizer per acre. In Example No. 1, the required amount of fertilizer was 100 pounds per acre. Now since the required amount is 500 pounds, the amounts of DAP and Potash, in this case, will have to be multiplied by a factor of 5 ($500/100 = 5$). Thus:

For the required 100 pounds of 6-24-24 fertilizer per acre, it is acceptable to have 52.2 pounds of DAP (18-46-0) and 40 pounds of Potash (0-0-60) cold-blend or total weight of 92.2 pounds.

For the required 500 pounds of 6-24-24 fertilizer per acre, the cold blend must have at least 261 pounds (52.2×5) of DAP and 200 pounds (40.0×5) of Potash or total weight of 461 pounds.

Example No. 3

Example No. 2 shows the amounts of different ingredients for the cold blend fertilizer with DAP and Potash when the plan requires 500 pounds of 6-24-24 fertilizer per acre (261 pounds of DAP and 200 pounds of Potash). The inspector should recognize that number of acres which are being seeded and calculate the amount of fertilizer that should be spread.

For example: The plan requires 500 pounds of 6-24-24 fertilizer per acre and there are 35 acres that will be seeded. The contractor brings in the cold blend fertilizer with DAP and Potash. From Example No. 2, the following calculations should be done:

DAP amount: $(261 \text{ pounds/acre}) \times 35 \text{ acres} = 9,135 \text{ pounds of DAP}$

Potash amount: $(200 \text{ pounds/acre}) \times 35 \text{ acres} = 7,000 \text{ pounds of Potash}$

The inspector can use the same calculation procedure to figure the amounts of different ingredients for the project(s). The followings are some quick guidelines to check the amounts **per acre**.

For 500 pounds of 6-24-24 fertilizer per acre with a cold blend with MAP, Urea and Potash, the individual amounts are:

- 231 pounds of 11-52-0 MAP
- 10 pounds of 46-0-0 Urea
- 200 pounds of 0-0-60 Potash

For 500 pounds of 6-24-24 fertilizer per acre with a cold blend with DAP and Potash, the individual amounts are:

- 261 pounds of 18-46-0 DAP
- 200 pounds of 0-0-60 Potash

For 400 pounds of 6-24-24 fertilizer per acre with a cold blend with MAP, Urea and Potash, the individual amounts are:

- 185 pounds of 11-52-0 MAP
- 8 pounds of 46-0-0 Urea
- 160 pounds of 0-0-60 Potash

For 400 pounds of 6-24-24 fertilizer per acre with a cold blend with DAP and Potash, the individual amounts are:

- 209 pounds of 18-46-0 DAP
- 160 pounds of 0-0-60 Potash

For 750 pounds of 13-13-13 fertilizer per acre with a cold blend with MAP, Urea and Potash, the individual amounts are:

- 188 pounds of 11-52-0 MAP
- 167 pounds of 46-0-0 Urea
- 163 pounds of 0-0-60 Potash

For 750 pounds of 13-13-13 fertilizer per acre with a cold blend with DAP, Urea and Potash, the individual amounts are:

- 212 pounds of 11-52-0 DAP
- 129 pounds of 46-0-0 Urea
- 163 pounds of 0-0-60 Potash

For 450 pounds of 13-13-13 fertilizer per acre with a cold blend with MAP, Urea and Potash, the individual amounts are:

- 113 pounds of 11-52-0 MAP
- 100 pounds of 46-0-0 Urea
- 98 pounds of 0-0-60 Potash

For 450 pounds of 13-13-13 fertilizer per acre with a cold blend with DAP, Urea and Potash, the individual amounts are:

- 127 pounds of 11-52-0 DAP
- 77 pounds of 46-0-0 Urea
- 98 pounds of 0-0-60 Potash

Again, the separate amounts are for one acre. The inspector should multiply these amounts by the number of acres being seeded.

7.22 APPLICATION OF FERTILIZER

The fertilized area shall be disked and rolled with a cultipacker prior to seeding. The project engineer may approve the substitution of a harrow if a cultipacker cannot be operated satisfactorily.

7.30 MULCH

All permanent seeding with prepared seedbeds are required to be mulched. The mulch shall be "blown" and "tucked in" as soon after seeding as soon as possible. Machine printed weight tickets are required for all mulch used. The inspector should receive the weight ticket and obtain a count of the bales at the time the material is delivered to the job site. The average bale weight can then be calculated.

Following the last rolling with the cultipacker, mulch should be applied to the specified areas at the required rate. A straw mulching machine capable of spreading mulch uniformly is used for applying mulch. Areas inaccessible to a straw mulching machine should be mulched by hand.

Immediately after mulch material has been applied, it should be anchored with a mulch stabilizer operated on the contour.

Mulch shall be Certified Noxious Weed Seed Free Mulch as certified by the Iowa Crop Improvement Association (ICIA) or an adjacent state's Crop Improvement Associations. Bales should have a white certification label securely attached to the bale or will be bound with purple and yellow twine. A transit certificate is also available from the ICIA.

The specifications require straw to be bailed the same growing season as the grain was harvested from the plant. Mulch may consist of native grass straw, which is typically harvested beginning in August. If you encounter native grass straw on your project that is shown as harvested earlier than August of that same calendar year, contact the Office of Roadside or the Earthwork Field Engineer.

Refer to http://www.iowacrop.org/Weed_Free.htm for more information on the ICIA Noxious Weed Seed Free Mulch Program.

7.31 EXAMPLE CALCULATION (English Units only)

Example of area to be mulched at the rate of 1 1/2 tons/acre:

Measured area is 2.6 acres, the average weight per bale is 48 pounds. Compute as follows: 1 1/2 tons/acre X 2.6 acres = 7,800 lbs. of mulch required for the area.

Number of bales required: $\frac{7,800 \text{ lbs.}}{48 \text{ lbs./bale}} = 162 \text{ bales}$

7.32 HYDRO-MULCH

Hydro-mulch (or hydraulic mulch) is typically applied following the application of seed, but it may be used as a stand-alone practice just like straw mulch.

If seeding is performed in conjunction with hydro-mulching, the specifications require hydro-mulch to be applied as a separate operation.

There are different types of hydro-mulch, and each has different material properties and typical uses:

- Wood Cellulose Fiber:
 - Produced from whole wood chips or a combination of whole wood chips and recycled fiber from sawdust, recycled paper, chipboard, or corrugated cardboard
 - Use is typically limited to slopes 6:1 or flatter.

- Typically requires 24 hours to dry before rainfall occurs in order to be effective against erosion.
- Expected longevity is up to 3 months.
- Bonded Fiber Matrix (BFM):
 - Produced from long-strand wood fibers held together by organic tackifier and bonding agent
 - May be used on slopes up to and including 2:1.
 - Typically requires 24 hours to dry before rainfall occurs in order to be effective against erosion.
 - Expected longevity is 3 to 12 months.
 - Provides superior erosion protection than straw mulch or wood cellulose hydro-mulch.
- Mechanically Bonded Fiber Matrix (MBFM):
 - Produced from long-strand wood fibers and crimped, interlocking synthetic fibers.
 - May be used on slopes up to and including 2:1.
 - Requires 2-hour cure time, thus provides fast protection against erosion.
 - Expected longevity is 12 months or greater.
 - Provides superior erosion protection than straw mulch or wood cellulose hydro-mulch.

The most commonly used type of hydro-mulch used on DOT projects is BFM.

All types of hydro-mulch are dyed green to facilitate visual metering during application.

The minimum rate of application is 3,000 lb./acre.

The mixing chart below is based on 3,000 lb./acre:

# of 50 lb. Bales	BFM (lb.)	Water * (gallons)	Application Rate of 3,000 lb./acre	
			Sq. Ft.	Acre
1	50	100-125	726	0.017
2	100	200-250	1,452	0.033
4	200	400-500	2,904	0.067
8	400	800-1,000	5,808	0.133
16	800	1,600-2,000	11,616	0.267
32	1,600	3,200-4,000	23,232	0.533
64	3,200	6,400-8,000	46,464	1.067
128	6,400	12,800-16,000	92,928	2.133
30	1,500	3,000-3,750	21,780	0.500
60	3,000	6,000-7,500	43,560	1.000

*Range is provided as guidance. Water amount varies depending on manufacturer and product.

Approved sources and products of hydraulic mulch are listed in the Materials Approved Products Listing Enterprise (MAPLE).

7.40 WATER POLLUTION CONTROL (SOIL EROSION)

While this section addresses soil erosion on all projects, *Construction Manual 10.30* addresses the additional requirements of a storm water discharge permit. Coverage under the Iowa Department of Natural Resources permit is required for all projects which disturb more than 1 acre and are administered by the Iowa Department of Transportation.

The primary objective is to control soil erosion and sedimentation caused by soil erosion during construction with reasonable and economical construction practices.

While the contract documents indicate locations of sediment control devices (silt fence, ditch checks, and silt basins), their actual location should be verified in the field by the contractor and project engineer in order to fit existing conditions.

The erosion control devices should not be limited to those which are included in the contract documents. The project engineer should authorize adding any device that will be most effective in controlling erosion.

The primary method for temporary erosion control is stabilizing crop seeding and fertilizing. The application of stabilizing crop seeding does not require inoculation, application of sticking agent or fungicide, except for hairy vetch and other legumes which require inoculation.

Stabilizing crop seeding requires seedbed preparation as described in *Specification 2601.03, B, 4, a* and covering and compacting as described in *Specification 2601.03, C, 3*.

Where possible, the installation of silt fence as perimeter control and for ditch checks should be installed prior to any soil disturbing activities occurring on the project.

7.41 CONTRACTOR REQUIREMENTS

The contractor's responsibility is to insure that soil erosion is minimized and to prevent eroded soil from leaving the construction project onto adjacent property. Timely installation of sediment control devices, such as silt fence and ditch checks, will help to prevent this damage from occurring. The most effective erosion control practice is stabilized crop seeding which shall be done as the grading progresses. This may require the erosion control contractor to mobilize and seed more than once.

The contractor's Erosion Control Implementation Plan (ECIP) is the contractor's schedule (sequence and timing of operations) and proposed method for accomplishing the required erosion control. The ECIP must be submitted to the project engineer prior to the Preconstruction Conference and be accepted before commencing work.

The contractor's ECIP should include information such as that shown in the ECIP Worksheet (Appendix 7-1). Updates to the ECIP may be included on the ECIP Worksheet or the ECIP Update Checklist (Appendix 7-2). Copies of both documents are available at http://www.iowadot.gov/Construction_Materials/earthwork.html. For additional clarification, a flowchart is provided in Appendix 7-3 showing when a contractor is required to submit an ECIP.

If the temporary erosion control is to be performed by a subcontractor, the subcontractor should be involved in developing the work plan but the plan should be submitted by the contractor.

Damage due to siltation on private property shall be corrected by the contractor with no expense to the contracting authority.

7.42 MOBILIZATION FOR EROSION CONTROL

Mobilization for Erosion Control is applied to projects according to *Standard Specifications 2602.03, L*. For additional clarification, a flowchart showing when Mobilization for Erosion Control applies to a project is provided in Appendix 7-4. Payment for mobilization would apply to any contract items from *Standard Specification Sections 2601 or 2602* (excluding mowing, debris pick-up, monitoring well, or removal items). Payment for Mobilization for Erosion Control also does not apply to watering since Section 2601 already provides for payment for Mobilization for Watering.

When erosion control items are incidental, there is no payment for erosion control mobilizations.

Mobilizations for emergency erosion control should be ordered when there is a serious and urgent nature which is beyond normal maintenance of controls.

To determine if a situation warrants an emergency versus regular mobilization, review the location and the weather forecast. For example, the Engineer should order an emergency erosion control mobilization if a site has experienced a major rain event that has shown installed controls at a box culvert outlet are not adequate or have failed and there is another rain event in the immediate forecast.

7.43 EROSION AND SEDIMENT CONTROL TRAINING AND CERTIFICATION PROGRAM

On projects where there is a National Pollutant Discharge Elimination System (NPDES) storm water permit, the Contractor is required to have an Erosion Control Technician (ECT) and an Erosion & Sediment Control (ESC) Basics trained individual. Projects that require NPDES storm water permit will have a Pollution Prevention Plan in the contract documents. The ESC Basics training requirements begin for contracts let on or after October 15, 2013, and ECT requirements begin for contracts let on or after April 15, 2014.

Additional information on the program requirements and FAQs is located at:
http://www.iowadot.gov/Construction_Materials/earthwork_erosion/ESControl_training.html

List of ECTs is provided at :
<http://www.iowadot.gov/training/ttcp/cert.tech.pdf>
This list is updated annually.

List of ESC Basics trained individuals is provided at:
<http://www.iowadot.gov/training/ttcp/Erosion%20Control%20Basic.pdf>
This list is updated approximately monthly.

During the course of a project, presence of ESC Basics trained individual should be documented periodically in the inspector's IDR.

7.50 SODDING

The suggested sequence for placement of sod is:

Shape Sodbed

Ditch channels should be shaped in order to obtain a relatively level, flat-bottom ditch which will drain without water ponding. The depth should be a minimum of 6 inches below adjacent ground. Many ditch failures result because the ditch bottom is not level, causing a concentration of flow on one side of the ditch.

Apply Fertilizer

The first application of fertilizer shall be applied prior to laying of sod. Fertilizer must be spread with a mechanical spreader at a uniform rate of application. A cyclone seeder may be used.

Place Sod

Note the quality of sod, making sure it is free of objectionable material (tree roots, brush, stones, etc.) also that it is free of noxious weeds and relatively free of all other weeds and grasses other than bluegrass. The sod is to be mowed to a height of 1 1/2 to 2 inches prior to cutting. On the sides and bottoms of ditches and channels, strips must be laid at right angles to the centerline of the channel.

The project engineer may order areas staked to prevent loss of sod before the root system becomes established. Staking of sod channels ordered by the project engineer is paid for at 25 percent of the contract price for sodding.

Sod can be placed until the ground freezes at the construction site or at the sod farm.

Finish Sod

Smooth disturbed areas along the edges of the sod. Be sure that no ridge of dirt remains along side the sod ditch, and that the disturbed area is properly shaped and sloped to allow water to run onto the sod.

Seed

Reseed disturbed areas, using the seed mixture specified.

Mulch

Mulch disturbed areas, using the mulch rate specified.

Water

Water the sod within one hour after laying. Five additional waterings will be required with the second, third, and fourth waterings performed at 4 calendar day intervals, and the fifth and sixth waterings performed at weekly intervals. The amount of water required for sodding varies depending upon soil type, soil moisture, and local weather conditions at the time of sodding. Watering is to saturate the soil to a depth of 4 inches or a maximum of 100 gallons of water per 100 square feet. This is roughly equivalent to a 1 1/2 inch rainfall but depends on soils conditions, rate of rainfall, and topography of land. Sod should be watered with a spray, and not much pressure. Too much pressure disturbs the sod and has a tendency to wash the dirt away from its edges. All areas disturbed in preparation of sod ditches must be watered with the sod after seeding, fertilizing, and mulching. The scheduled waterings may be deleted if precipitation has moistened the soil to a depth of 4 inches.

The specifications provide for a price adjustment per calendar day if the Contractor does not complete the watering.

Tamp

Tamp or roll sod as specified if necessary to secure bonding.

Special Ditch Control

Place special ditch control over the sod when specified. This material is normally specified on steep ditch grades, and at the outlet end of roadway pipes where large volumes of runoff water may occur.

7.51 PAYMENT

Payment for the sod item will not be made until the watering has been completed. If the quantity of sod to be placed is large, the sod may be paid as a stockpiled material at the time all of the sod is installed according to specifications.

If the contractor fails to maintain the sod as specified above, washed out sod must be replaced at the contractor's expense.

Per Standard Specification 2601.05, A, 11, when there is a large area to be watered, the contract documents will include an item for Watering and payment will be based on the predetermined contract unit price per 1000 gallons. When an item for Watering is not included, then the cost of watering is included in the amount paid for the item to be watered.

Typically, projects that have a contract item for Watering should also include a contract item for Mobilization for Watering, unless they are identified as erosion control or landscaping projects. Initial watering required at installation will not be counted for payment of Mobilization for Watering.

7.60 SPECIAL DITCH CONTROL

Special ditch control is to be placed in conjunction with seedbed preparation and planting times as specified in *Specification 2601.03, B*.

The limits of ditches should be staked with flats or flags, and markers should be placed to one side of the ditch to remain visible during construction. The centerline of the ditch is determined by the low point of the ditch. It may be necessary to shift the ditch in order to maintain the best possible alignment and to avoid sharp turns in sod ditches.

7.61 PLACEMENT

The suggested sequence of work for special ditch control is as follows:

Shape

Shape the ditch and prepare the seedbed approximately 3/4 inch deep. If ditches are unstable and equipment leaves them in a rough condition, the seedbed must be prepared by hand. The ditches should be shaped so that the ditch drains without water ponding and has a minimum depth of 6 inches. Minor irregularities in ditch alignment must be corrected so the completed ditch will follow the ditch line constructed during the grading operation. This may not be possible in cases of severe washing of the ditch bottom. All rocks and clods 1 1/2 inches in diameter, and all sticks and other materials, which prevent contact of the special ditch control materials with the seedbed, shall be removed.

Check Slots

Install check slots as required. Take care that all check slots are carefully and properly installed. The success of the ditch may be dependent on proper installation of the check slots.

Finish

Smooth disturbed areas adjacent to ditch control. Make sure that no ridge of dirt remains alongside the ditch, and that material excavated from the ditch channel is properly shaped and sloped to allow water to run onto the special ditch control material. This area should be raked.

Fertilize

Fertilizer should be applied at the proper rate with a mechanical spreader. A cyclone seeder may be used to secure a uniform rate of application.

Seed

Seed mixture and rate of application are specified. Seed must be applied in the same manner as fertilizer. Make sure that the required legumes are properly inoculated.

Special Ditch Control Material

Special ditch control materials must be applied without tension and in the direction of the flow of water since there may be some settling of low or filled portions of the ditch and some shrinkage of the material. Do not stretch the material. Install staples as specified in the Design Standards.

7.62 WATERING

Special ditch control should be watered initially by the end of the day following installation. Water should saturate the soil to a depth of approximately 2 inches with the maximum of 50 gallons of water per 100 square feet. This is roughly equivalent to a $\frac{3}{4}$ inch rainfall but depends on soils conditions, rate of rainfall, and topography of land. Three additional waterings are required at one week intervals, depending on weather conditions. The scheduled waterings may be deleted if precipitation has moistened the soil to a depth of 2 inches.

The specifications provide for a price adjustment per calendar day if the Contractor does not complete the watering.

7.63 PAYMENT

Payment for the special ditch control item will not be made until the watering has been completed.

Per Standard Specification 2601.05, A, 11, when there is a large area to be watered, the contract documents will include an item for Watering and payment will be based on the predetermined contract unit price per 1000 gallons. When an item for Watering is not included, then the cost of watering is included in the amount paid for the item to be watered.

Typically, projects that have a contract item for Watering should also include a contract item for Mobilization for Watering, unless they are identified as erosion control or landscaping. Initial watering required at installation will not be counted for payment of Mobilization for Watering.

7.70 SUGGESTED EROSION AND SEDIMENT CONTROL DEVICES FOR SPECIFIC SITUATIONS

The best way to control erosion is to minimize the disturbed areas and to get the disturbed areas stabilized as soon as possible. Stabilizing seeding should be the first option. This requires planning and coordination to get “things” finished and seeded. When seeding is done late in the season, the growth may not be enough to provide adequate protection to the soils. Thus, mulching should be considered along with the seeding. Also, there are many cases during the construction projects that special care or devices need to be utilized. Following are some situations/information and solutions that should be used as guidelines during construction:

Types of Soils

Typically, soils high in silt, low in clay, and low in organic material are the most erodible. Sediment control devices must be appropriate for the types of soil throughout the project. The inspector/engineer needs to review the soil sheets and soil report for the project.

Ditch Grade (% Slope) and Length

The steeper and longer the ditch, the faster and stronger the flow would be. Again, the ditches should be seeded. They may also require Special Ditch Control or Turf Reinforced Mat (TRM). Nevertheless, silt fence ditch checks or another type of ditch check (such as logs, wattles, rock, etc.) are still needed. The frequency and the distance between the checks must be determined.

The following guidelines are recommended for silt fence ditch checks:

<u>Ditch Grade</u>	<u>Approximate Spacing*</u>
1.0% to 2.0%	150 feet
2.1% to 4.0%	75 feet
4.1% to 6.0%	40 feet
More than 6.0%	25 feet

*For Loess and other highly erodible soils, these spacings should be decreased.

Information Source: Iowa Construction Site Erosion Control Manual, updated 2006.

If a silt fence ditch check has been overwhelmed and blown out twice, rock ditch checks (or check dams) should be installed. Rock ditch checks should be installed 15 feet beyond the edge of travel way and not installed in the median.

In addition to these guidelines, the length of the ditch must be considered, especially when the ditch grade is 3% or more. When the length of the ditch is more than 1,000 feet, one or maybe two rock checks should be placed. The first one should be about 100 feet from the lowest elevation and the second one may be 100 feet below the midpoint of the ditch length.

For ditches with grades steeper than 4.0% and longer than 1,000 feet, a rock flume is more appropriate than a rock ditch check. The rock flume, 30 to 40 feet in length, is constructed by placing erosion stone or Class E revetment at the lower end of the ditch. Additional rock flumes should be placed as needed for steeper ditch grades.

Drainage Ways/Ponds/Lakes/Wetlands, etc.

Silt needs to be prevented from leaving our project! Silt basins, riprap dams, silt fences, seeding, and available ROW should be looked at, especially when the construction work is close to drainage ways/ponds/lakes/wetlands.

ROW or at least temporary easement must be available to install the necessary erosion control devices near these “sensitive” areas. Depending on the situation, a silt basin or even a silt retention basin should be created to allow the silt to settle. A little dike at the lower side of the silt retention basin would certainly increase the storage volume. The overflow location of the dike could be armored with riprap to make sure that the water energy is minimal before leaving the ROW. Finally, a silt fence should be placed to catch the silt from escaping the project.

Height of the Fills for Bridge Berms

As the fills and/or the bridge berms get higher, the potential for erosion increases significantly. Without some seeding or mulching, there will be gullies on the slopes. Seeding or some sort of stabilization must be done as the fill is going up. Rough grading of the unseeded areas would decrease the velocity of the water.

Height of the Backslope

When the backslope is not too high (less than 10 feet) and the drainage area above the backslope is small, the potential for erosion on the backslope is low. However, when the backslope is high and the drainage area onto the backslope is large, something must be done. For example, a small intercepting ditch next to the top of the backslope could be utilized to carry the water along the top of the backslope down to the ditch to avoid the erosion on the backslope. Sometimes the runoff will be concentrated at one location. If this is the case, a letdown flume should be placed to minimize or prevent erosion.

When a sandy backslope is encountered, topsoil or cohesive soil should be used to dress the slope. A wood excelsior mat or straw mat would be the next choice for slope protection.

Culvert Ends

Since culverts are at the lowest spots, this is where the water will drain off. Most of the time, the water will be drained into a creek or drainage way. Silt fences or logs/wattles must be placed on both sides of the wing from the end of the wing at least around the toe and up onto the foreslope to catch the silt from the area right next to the culverts. Seeding has to be done as soon as possible.

In case of water discharging strongly from the pipe onto an adjoining property/farm/pond, etc., especially in the no-ditch situation, many things may be needed. First, the ROW has to be available. Second, one or two riprap dams or a splash basin may be needed to slow down the water. Finally, one or two silt fences adjacent to the ROW line to catch silt would be beneficial.

End of Ditches

At the end of the ditch, water is going to drain off the highway project. Depending on the situation, riprap dams, rock checks, rock flumes, silt basins, and silt fences should be looked at. For example, the slope of the ditch may be steep and carrying a large volume of water. The soil for the project is very sandy. In this case, a riprap dam may be needed near the end of the ditch. Also, where a steeper slope occurs, a rock flume may

be added. In contrast, if the project is in a flat area with mainly cohesive soil, maybe a silt ditch check is all that is required.

Letdown Pipes

The slope of letdown pipes is very steep. Thus, the velocity of the water at the outlet of the pipe is very high. This water will cause severe erosion. In this case, a silt retention basin at the top allowing water into the pipe slowly should be considered. Also, a layer of riprap with engineering fabric underneath or even a flume of riprap will need to be installed to dissipate the water velocity or energy.

Sometimes the outlet of the letdown pipe is right next to a creek. Because the water flow rate in the creek can be very high in the spring, the pipe must be protected. This means that riprap must be installed on both sides of the pipe and maybe even on the top to prevent scouring around the culvert and uplifting of the pipe.

Berm Face

Drainage from the median and ditches can cause erosion on the berm face. Rock flumes sometimes are needed to minimize the erosion on the berm face.

Drop Inlet or Intake

The flow rate at this location may be high. Turbulent flow may cause erosion. Silt may enter the storm sewers or farm tiles. In order to minimize erosion, preventive actions should have been taken at other places so that the water flow rate and siltation are minimal. Silt fences should be placed around the drop inlets or intakes.

Bridge Deck Drain

When the deck is wide and high above the ground, the water dropping on the ground from the deck drain can cause erosion. Erosion stone or riprap may have to be placed under the deck drain to absorb the energy from the water impact.

Borrow Area

Sometimes the borrow is located on a hill. After the topsoil is stripped and excavation begins, water runoff from the borrow could be high. Silt fences may not be able to hold the water. A small dike along the low side of the borrow would minimize the potential of the silt leaving the borrow.

Terraces would also be helpful.

V-Ditch

A V-Ditch is not the most desirable shape for a ditch; but, due to site conditions, they exist. Some seeding or mulching must be done. In addition, ditch checks should be placed in the ditch to slow down the water velocity.

Area of Super Elevated Curve

Due to the increased slope of super-elevated curves, surface water in the curve will flow to a concentrated area. During the grading project, erosion problems may be minimal. However, after the pavement is completed, the velocity of the water draining off the pavement will increase significantly. A letdown flume may be needed to be constructed on the "low" side of the super-elevated curve.

Silt Curtains

Silt curtains are included as bid items with projects when there will be construction activities in or beside a water body (such as a river, lake, creek, or stream). Typically, only Floating Silt Curtain (Hanging) will be included as a bid item. However, there are rare times when the Office of Location and Environment will specify the use of Floating Silt Curtain (Containment) bid item.

The main purpose of the silt curtain is to isolate the work area from the water body, thus allowing sediment to settle out of suspension. A silt curtain alone should not be considered as adequate perimeter control. Other sediment controls, such as silt fence or slope and sediment control devices, should be installed upland.

Silt curtains should not be installed across a river or stream. Refer to *EC-202* for installation configurations.

For creeks, streams or rivers, the Office of Design estimates the silt curtain bid quantity as the length of the water body from ROW to ROW plus any easements. This quantity is doubled if working on both sides of the creek, stream or river. The contractor and inspector/engineer should review the contractor's plan for disturbed areas prior to installing a silt curtain in order to determine the needed length to contain the disturbed zone.

The inclusion of a Floating Silt Curtain (Hanging) bid item does not mean the silt curtain has to be installed. Rather, the use of the silt curtain is at the discretion of the inspector/engineer. For example, a box culvert contractor may choose to bypass pump water from the creek around the worksite. In this case, the contractor's methods isolate the work area from flowing water, and therefore, a silt curtain is not needed.

Temporary Stream Diversions

A temporary stream diversion is to be included as a bid item for projects involving installation or extension of box culverts or precast box culverts 6 feet by 6 feet or larger and arch pipe culverts 102 inches by 62 inches or larger. For smaller box culverts and arch pipe culverts, the contractor is to determine the means and methods of managing the water, complying with *Specification 1105.13*, and this work will be incidental to the project.

Temporary stream diversions were developed as a best management practice when working in areas where flows are low enough and/or the watershed is small enough to allow normal base flows to be handled practically in a small diversion channel or pipe.

This practice allows the contractor several methods of diverting the flow around the work area – through use of a diversion channel or pipe or hose.

Even if the creek or stream may be dry or there is a minimal flow, the temporary stream diversion dikes and energy dissipation material should be in place in the event of rain.

The energy dissipation material (i.e. revetment) is included in the bid price of the temporary stream diversion. However, upland sediment control measures are not included in the bid price and should be paid for separately.

Refer to *Standard Specifications Section 2418* and *Standard Road Plan EW-402* for more information.

Erosion Control Implementation Plan (ECIP) Worksheet

Project No.: _____

County: _____

Type of Work: _____

Prime Contractor: _____

Contact Person: _____

Phone: _____

Erosion Control Technician (ECT) and Certification Number:

ESC Basics Trained Individual(s) and Company:

Contact of the subcontractor responsible for installation & maintenance of erosion/sediment controls:

Name: _____

Company: _____

Address: _____

Phone: _____

Description of intended schedule and sequence of major land disturbing and erosion/sediment control activities (include number of mobilizations if required by specification):

Include staging and maintenance, method for winter shutdown and removal of temporary measures (if required for the project). Describe any additional measures that are needed due to late season work.

Describe measures necessary to control erosion based on your schedule or sequence of operations. Explain how you plan to implement erosion control plan in stages. Indicate measures that must be in place before grading begins.

Based on your staging, are there areas where additional erosion control beyond that shown in the plans is anticipated? If so, provide information.

Other:

Describe dewatering methods and locations. What controls will be used at the outlet?

Provide information regarding location and protection of stockpiles.

Updates:

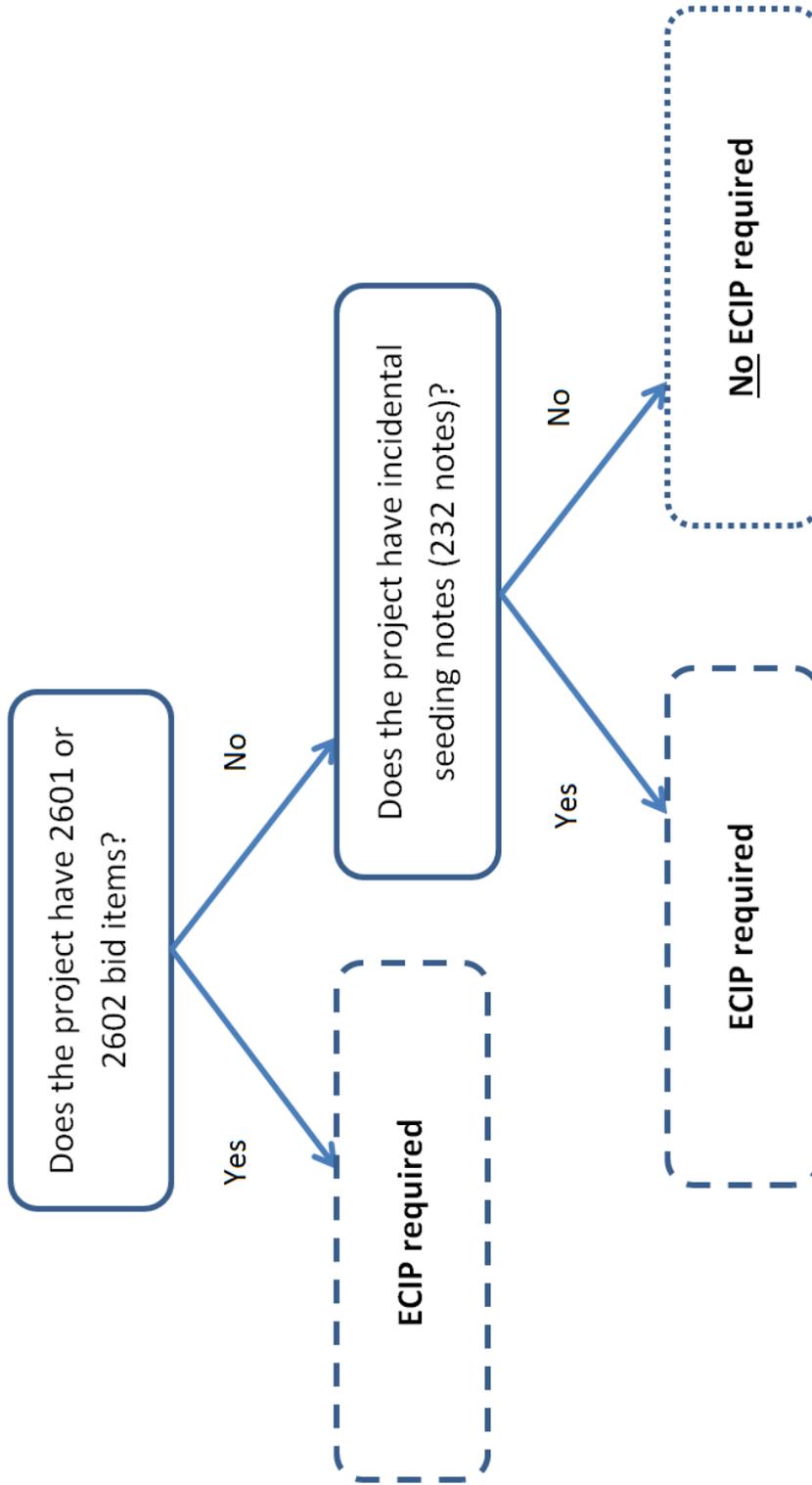
Update ECIP to address changes in the order of operations or staging, weather changes, or any other changes required to comply with permit requirements.

Update ECIP to address changes in the number of mobilizations.

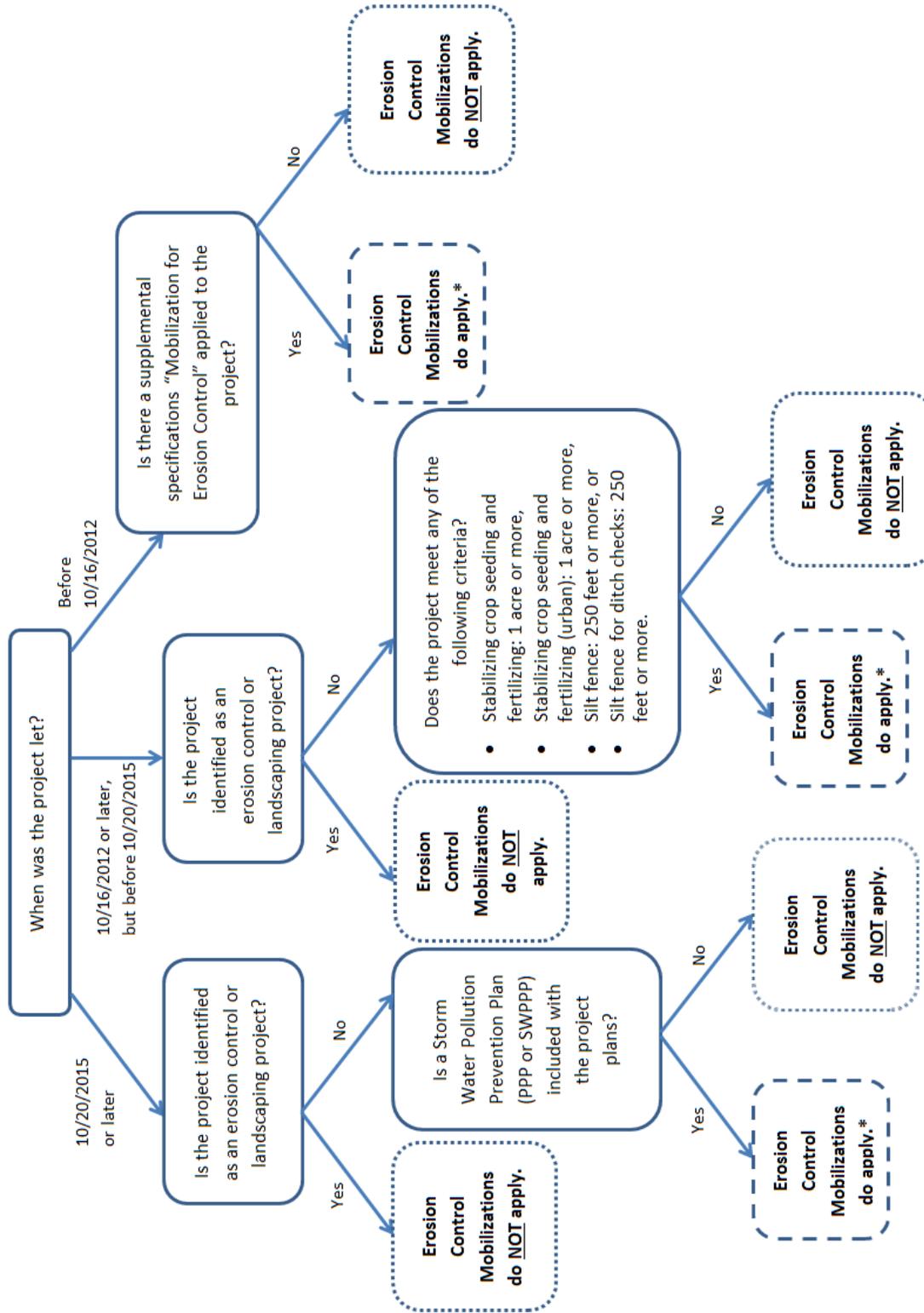
ECIP UPDATE CHECKLIST

	Install	Maintain	Remove	Location(s) and Schedule
Silt Fence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Silt Fence Ditch Check	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Perimeter & Slope Sediment Control Device	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Rock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Silt Basin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stabilizing Seeding & Mulching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Permanent Seeding & Mulching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Is an Erosion Control Implementation Plan (ECIP) required?



Should Mobilizations for Erosion Control apply to the project?



* Payment for mobilization applies to contract items from [Sections 2601](#) and [2602](#), excluding watering, mowing, debris pickup, monitoring well, or removal items.

IOWA DOT EROSION CONTROL TECHNICIAN CERTIFICATION

NPDES AND SWPPP

Kerry Newbanks, Des Moines Area Community College
Michael Heller, Iowa Department of Transportation

Housekeeping

- Introductions
 - Instructors
 - Students
- Materials
 - Reference manual
 - Field Guide
 - Updates

Housekeeping

- Sign-in/Registration Card
 - IaDOT Function Code: 130
- Restrooms
- Smoking
- Food/Drink
- Stories and experiences encouraged please omit specific names and organizations

Schedule - Day One

- **9:15 to 11:30** – Erosion process, NPDES Permit and SWPPP requirements
- **11:30 to 12:30** – Lunch
- **12:30 to 3:00** – Plans and Specifications
- **3:00 to 4:00** – BMPs The Good, Bad, & Ugly

Schedule - Day Two

- **9:00 to 10:30** – Storm Water Inspections and Reports
- **10:30 to 11:30** – EPA Inspections
- **11:30 to 12:30** – Lunch
- **12:30 to 2:00** – Case Study, Group Exercise, and Review
- **2:00 to 4:00** – Celebration of Knowledge
 - Certification Exam
 - Need a calculator – no cell phone

Class Objectives

- Understand role of Erosion Control Technician
- Ensure compliance with the NPDES General Permit No. 2 and Iowa DOT requirements
 - Understand importance of implementation (why)
 - Understand Permit requirements
 - Understand SWPPP
 - Roles of Contractor, Inspector, and Iowa DOT
 - Understand and incorporate BMP

Role of the Erosion Control Technician

- Iowa Department of Transportation I.M. 213 App. D
 - Review details of contract documents with respect to erosion and sediment control
 - Assign monitoring responsibilities to Erosion & Sediment Control Basics trained staff
 - Review inspection reports
 - Provide input on initial Erosion Control Implementation plan (ECIP) and updates
 - Provide onsite reviews as requested

Why is it important to Understand S.W. Permits and Requirements – Chapter 1

- Environmental Protection Agency (EPA)
 - Identifies which activities or facilities require permits
 - The Department of Natural Resources (Iowa DNR) has authority to grant NPDES permits
- National Pollutant Discharge Elimination System Program (NPDES)
 - Regulates discharge of storm water from sites

National Pollutant Discharge Elimination System Program (NPDES) – Chapter 1

- The goal or intent of the NPDES
 - Improve water quality
 - Reducing contaminants in storm water runoff.
- Noncompliance constitutes a violation:
 - Code of Iowa
 - Clean Water Act

Different Types of NPDES Permits

- NPDES General Permit No.1
 - "Storm Water Discharge Associated With Industrial Activity"
 - For Manufacturing, processing, or raw material storage at an industrial plant
- NPDES General Permit No.2
 - "Storm Water Discharge Associated with Industrial Activity for Construction Activities"
 - Land-disturbing activities
 - Focus of this class

Different Types of NPDES Permits

- NPDES General Permit No.3
 - "For Asphalt Plants, Concrete Batch Plants, Rock Crushing Plants and Construction Sand and Gravel Facilities"
 - Mixing or producing portable or permanent
- MS-4 – Municipal Separate Storm Sewer Systems
 - Similar to General Permit No 2 but issued and applied for cities and universities with storm sewer systems
 - <http://www.iowadnr.gov/InsideDNR/RegulatoryWater/NPDESStormWater/MS4Permittees.aspx>

Individual Permits

- 404
 - issue by Army Corp of Engineers for placement of fill material within wetlands, streams, ponds, etc.
- 408 (Major & Minor)
 - For any proposed alteration/modification to existing Corps project (ie: levee, flood risk reduction project)
- Floodplain
 - DNR permits for bridges over streams that drain 100 sq. miles of rural or 2 sq. miles of urban
- Sovereign Lands
 - Bridge projects over DNR designated rivers

Impacts when Permit Requirements are not followed– Chapter 1

- Financial
- Environmental



Financial Impacts of Excess Sediment in Construction Runoff – Chapter 1

- Penalties
 - DNR and EPA
 - EPA - \$ per day for each violation
 - DNR - \$ per day for each violation
 - Cost of litigation

Financial Impacts of Excess Sediment in Construction Runoff – Chapter 1

- Repairs to damaged systems
- Expenditure of Resources
 - Equipment and man-hours



□ This gravel road needed extensive maintenance to repair silt runoff.

Recent Penalties

- S.C. DOT and GSR Jedburg fined \$40,000
 - Nov. 2012
- MnDOT & Northstar Materials Inc. fined \$235,170
 - Koochiching County, MN. Aug. 2012
- Four private companies fined \$847,000 by EPA
 - Seattle, WA – Aug. 2013
- Minnesota Power agree to \$53,000 in state park improvements in lieu of civil penalty.
 - Duluth, MN July 2014
- Garden Homes and affiliated companies fined \$225,000 and implement measures to improve company's practices
 - New Jersey May 2015

Recent Penalties

- F & R Contractors Corp. and F&R Contractors LLC
 - \$500,000 civil penalty
 - Establish new staffing positions to oversee stormwater compliance
 - Adopt company wide practices to require site meetings and inspections
 - Provide comprehensive compliance training for employees and contractors
 - Puerto Rico, May 2015

Origins of Erosion Control Technician Certification

- Iowa DOT and 3 contractors fined \$60,000
 - Tama, IA Jan 2011
- DOT/AGC Task Force
 - Improvements of erosion control practices
 - Clarification of roles and responsibilities
 - Identified Training needs
 - Erosion and Sediment Control Training and Certification Program

Erosion and Sediment Control Training and Certification Program – 2 levels

- IaDOT requires for projects with NPDES permit
- Erosion & Sediment Control Basics (ESC Basics)
 - 1-2 hr. online training
 - Prime Contractor required to have one per project
 - DOT required to have one per project
 - No exam
 - Valid for 2 years

Erosion and Sediment Control Training and Certification Program – 2 levels

- Erosion Control Technician (ECT)
 - 2-day certification class
 - Prime Contractor required to have one on staff
 - DOT required to have one per RCE
 - 2-hour certification exam
 - Valid for 5 years
 - One update (web-based) required between cert and recert.

Environmental Impacts of Excess Sediment in Construction Runoff

- Suspended sediments
 - Reduces fish feeding success and reproduction
 - Absorbs sunlight, inhibiting aquatic plant growth
- Deposited sediments
 - Flooding
 - Destroys habitat
 - Impacts Recreational activities
- Loss of soil

EPA and DNR Roles – Chapter 2

- Determine compliance with permit requirements
- Assess adequacy of Best Management Practices (BMP's)
- Accomplished by on-site inspections
 - ▣ Of BMP's in place
 - ▣ Documentation review (SWPPP)

EPA and DNR Roles – Chapter 2

- Not going to tell or show how to
 - ▣ Looking at “is it working or is it enough”
- Both may issue formal penalties or warnings
 - ▣ Notice of Violation
 - ▣ Administrative Order

What to expect during an Inspection – Ch 2

- Terms
 - ▣ SWPPP or PPP (Storm Water Pollution Prevention Plan) Found in the C sheets
 - ▣ Site Map – Map of locations of BMP's
 - Standard IADOT plans will consist of tabulations, quantities, and SWPPP tab
 - ▣ BMP – Best Management Practices
 - any measure, device, or practice used to reduce or eliminate the amount of erosion or sediment released from the site

Compliance and Route to Success

- Be familiar with PPP
- Be familiar with BMP's on project
- Discuss SW requirements at preconstruction meeting
- Keep SWPPP and records organized

Compliance and Route to Success

- Keep up with inspections and reports
 - ▣ Missing report = violation
- Contractors and inspectors work as team
- Be proactive
 - ▣ plans are oftentimes a minimum
 - ▣ Use additional controls where needed and before absolutely necessary

What causes Erosion? – Ch 3 Field Guide

- Once vegetation is removed soil becomes susceptible to erosion
- Erosion occurs when wind or water dislodges soil particles
- Process continues by transportation of particles
- Ends when particles are deposited in waterways
- Water-generated erosion is most severe type

Causes of Erosion and Loss of Sediment

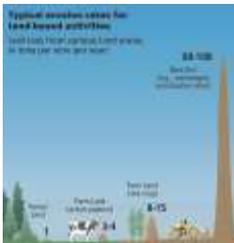
- Construction activities
 - Vegetation and topsoil are removed
 - Increasing Erosion potential by wind and water



Causes of Erosion and Loss of Sediment

- Grading and compacting subgrade
 - Increases amount of runoff (volume) and speed (rate)
- Sediment travels from unprotected surfaces to waterways

Image Ch. 1 p. 4



The Erosion Process – Ch 3

- Raindrop – Initial rain impacts soil
- Sheet – Raindrops consolidate into shallow flow



Levels of Erosion – Ch. 3

- Rill – Sheet flow concentrates in irregularities in the surface forming rills
- Gully- rills continue to increase into deeper channels
 - Major difference between gully and rill erosion is magnitude.

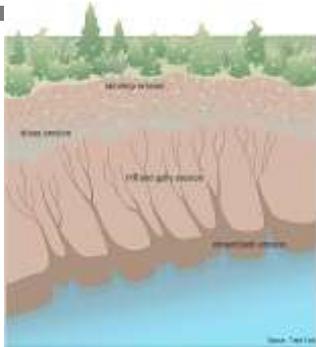


Levels of Erosion – Ch 3

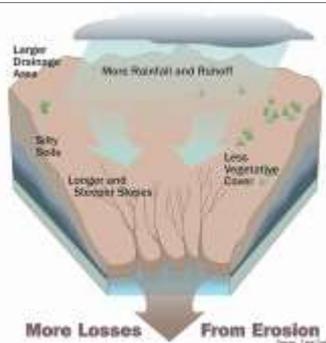
- Stream bank or channel – volume and velocity of flow causes movement in stream bed and bank materials.



Types of Erosion – Ch 3



Influences on Erosion– Ch 3 Field Guide



Influences on Erosion– Ch 3 Field Guide



Influences of Erosion and Loss of Sediment – Ch 3

- Erosion Potential is effective greatly by site conditions
- p. 25 Field Guide



Soil Surface Condition	Effect on Erosion Potential
Compacted & Smooth	+30%
Track walked along contour	+20%
Track walked up & down slope	-10%
Punch or crimped straw	-10%
Rough, irregular cut	-10%
Loose to 12 in. depth	-20%

Source: Goldman, 1988

Objectives of Erosion and Sediment Control

- First - use best practices and controls to manage the amount of erosion that occurs
 - By implementing practices that reduce sheet and rill erosion will reduce wind erosion as well
- Second – Understand that some erosion will occur, implement best practices and controls to capture (manage) sediment that leaves site.

Hence...

- Erosion Control – limit the amount of erosion that occurs
- Sediment Control – collect or allow soil to settle to prevent sediment from traveling offsite
- Run-off Control – to control or divert flow of water
- The best approach is a combined practices

QUESTIONS?
NEXT NPDES PERMIT REQUIREMENTS

Permit Requirements – Reference Manual NPDES Permit

- Iowa Department of Natural Resources issues NPDES permits in Iowa
- Permits provide permission to discharge “clean” storm water from the project site.
 - If its not “clean” when it leaves the site, then you are noncompliant

Permit Requirements – Reference Manual NPDES Permit

- General Permit #2 coverage must be obtained for “Construction activities that disturb one or more acres of land”
 - NPDES Part I.B.1.A, Eligibility
- Some projects may have separate permits for separate areas
 - i.e. A borrow area not contiguous to project site, if one or more acres disturbed and drainable.

Permit Approval Letter

- Becomes part of SWPPP
- Contains NPDES Authorization Number



Permit Requirements – NPDES General
Permit #2

- NPDES Part II.G, Notice of Discontinuation (NOD)
- Release from permit requirements
- For Iowa DOT projects
 - NOD completed and submitted by RCE and Office of Construction after final stabilization has been achieved
 - Definition is found on page 13 of 15

Permit Requirements – NPDES General
Permit #2

- NPDES Part II.G, Notice of Discontinuation (NOD)
 - Final Stabilization means all soil disturbing activities at the site have been completed, and that a uniform, perennial vegetative cover with a density of 70% for the area has been established or equivalent stabilization measures have been employed or which has been returned to agricultural production.

Permit Requirements – NPDES General
Permit #2

- NPDES Part III, Special Conditions, Management Practices, and other Non-Numeric Limitations
 - Non-storm water discharges
 - Must be uncontaminated and noted in SWPPP

Permit Requirements – NPDES General
Permit #2

- NPDES Part IV, Storm Water Pollution Prevention Plan (SWPPP)
 - Identify potential sources of pollution
 - Describe and ensure implementation of practices
 - Goes by many names
 - SWPPP
 - PPP
 - Site map
 - Plan

Permit Requirements – NPDES General
Permit #2

- NPDES Part IV.A, Deadlines for Pollution Prevention Plan Preparation and Compliance
 - Part IV.A.1 SWPPP completed prior to NOI submittal
 - Part IV.A.2 Provide schedule of plan prior to start of construction activities

Permit Requirements- NPDES General
Permit #2

- Part IV.B.1, Signature and Plan Review
- SWPPP kept on-site
 - From date construction begins to date of final stabilization
- Part IV.B.2, Signature and Plan Review
- SWPPP made available
 - To EPA, DNR, or MS4 Inspectors

Permit Requirements- NPDES General
Permit #2

- Part IV.C, Keeping Plans Current
- Updated when there is:
 - Change in Design
 - Modification of type of practice
 - Change in Construction
 - Control size is changed from standards
 - Change in Operation
 - Maintenance performed on practices
 - Clean-outs or replacement
 - Additions or non-placements

Permit Requirements- NPDES General
Permit #2

- Part IV.D.1, Site Description
 - Description of nature of work
 - Estimates of total area disturbed
 - Drainage patterns and slopes
 - Locations of structural and stabilization practices
 - Locations of surface waters and discharge locations

Permit Requirements- NPDES General
Permit #2 (Reference Manual)

- Part IV.D.2, Controls
- Stabilization Practices
 - Descriptions of temporary and permanent controls
 - Measures shall be initiated on all disturbed areas as soon as practical
 - 14-21 day rule
 - In disturbed areas if construction activity will not occur for more than 21 calendar days stabilization must occur by the 14th day after activity has occurred
 - Snow cover precludes placement of practices

Permit Requirements- NPDES General
Permit #2 (Reference Manual)

- Part IV.D.2, Controls
- Structural Practices
- Description of practices designed to:
 - Divert flows
 - Store flows
 - Limit runoff

Permit Requirements- NPDES General
Permit #2 (Reference Manual)

- May include:
 - Silt fences
 - Earth dikes
 - Barriers
 - Drainage swales
 - Sediment traps
 - Check Dams
 - Rock outlet protection

Permit Requirements- NPDES General
Permit #2 (Reference Manual)

- .(2).(a), Structural Practices
 - Storage capacity requirements
 - Common drainage location that serves more than 10 acres at one time
 - 3600 cubic feet of basin storage per acre drained
 - If not attainable, equivalent controls must be placed
- .(2).(b), Structural Practices
 - Storage capacity requirements
 - Common drainage location that serves 10 acres or less at one time
 - Combination of controls providing 3600 cubic feet of storage per acre drained

Permit Requirements- NPDES General
Permit #2

- .(2).(c), Structural Practices
- Unless infeasible:
 - Use outlet structures that withdraw water from surface
 - Maintain natural vegetative buffers around water
 - Direct runoff to vegetated areas
 - Minimize soil compaction and preserve topsoil
 - Topsoil shall remain in the area covered by permit

Permit Requirements- NPDES General
Permit #2

- Structural Practices
 - Shall control storm water runoff volume and velocity to minimize erosion
 - Minimize channel and bank erosion and scour at discharge points
- Other Controls
 - Waste Disposal
 - Off-site tracking of sediments
 - Comply with state and local waste, sanitary or septic regulations

Permit Requirements- NPDES General
Permit #2

- Part IV.D.3, Maintenance
 - Describe procedures to maintain good effective operating controls
- Part IV.D.4, Inspections
 - Qualified personnel
 - Occur at least once every 7 calendar days
 - More detail tomorrow

Permit Requirements- NPDES General
Permit #2

- Part IV.D.7.A, Contractors
 - Plan must clearly identify contractors and/or sub-contractors implementing measures
- Part IV.D.7.B, Contractors
 - Signed co-permittee certification statement
- Part V Retention of Records
 - On-site, unless no covered structure available for storing
 - 3 hours to submit requested document

Permit Requirements- NPDES General
Permit #2

- Part VI, Standard Permit Conditions
 - DUTY TO COMPLY
 - CONTINUATION OF THE EXPIRED GENERAL PERMIT
 - NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE
 - DUTY TO MITIGATE
 - DUTY TO PROVIDE INFORMATION
 - OTHER INFORMATION

Permit Requirements- NPDES General
Permit #2

- Part VI, Standard Permit Conditions
 - SIGNATORY REQUIREMENTS
 - Part VI.H, CERTIFICATION
 - OIL AND HAZARDOUS SUBSTANCE LIABILITY
 - PROPERTY RIGHTS
 - SEVERABILITY
 - TRANSFERS
 - Part VI.M, PROPER OPERATION AND MAINTENANCE
 - Proper operation and maintain facilities and controls.

Permit Requirements- NPDES General
Permit #2

- Part VI, Standard Permit Conditions
 - Part VI.N, INSPECTION AND ENTRY
 - Must allow the DNR, EPA, or authorized MS4 representative access to site
 - Access and copy SWPPP
 - Inspect facilities or equipment
 - PERMIT ACTIONS
 - ENVIRONMENTAL LAWS

QUESTIONS?
NEXT IADOT SWPPP REQUIREMENTS

Why Storm Water Pollution Prevention Plan (SWPPP) is Important

- Address NPDES Permit requirements
- Establishes procedures for minimizing erosion and run-off
- Describes site characteristics and list pollutants
- Identifies measures (structural and non-structural) designed to minimize the discharge of contaminated storm water
- All IADOT projects with storm water permit must have SWPPP

SWPPP

- Addresses waste disposal and off-site vehicle tracking
- Maintenance and inspection
- Potential sources of pollution
- Contractor and/or subcontractors who will implement measures

SWPPP Location



SWPPP - I. Roles & Responsibilities – Designer Requirements

- PPP developed by designer
- Prepares and submits NOI
- Signature authority on the Base PPP and NOI

SWPPP - I. Roles & Responsibilities – Contractor Requirements

- Responsible for compliance and implementation of the SWPPP
- Prime contractors/subcontractors are co-permittees
 - ▣ Prime contractor is responsible for installation and maintaining
 - Construction Manual Chapter 10.33
- Submit a detailed erosion control schedule
 - ▣ Standard Specification 2602.03 (A)

SWPPP - I. Roles & Responsibilities – Contractor Requirements

- Install and maintain appropriate controls.
- Supervise and implement good housekeeping practices:
- Conduct joint inspections with inspection staff.

SWPPP - I. Roles & Responsibilities – RCE/Inspector

- Update PPP
 - ▣ Change in Design
 - Modification of type of practice
 - ▣ Change in Construction
 - Control size is changed from standards
 - ▣ Change in Operation
 - ▣ Maintenance performed on practices
 - Clean-outs or replacement
 - ▣ Additions or non-placements

SWPPP - I. Roles & Responsibilities –
RCE/Inspector

- Maintain an up-to-date record of co-permittees.
- Make plans & documentation available to the DNR/EPA/MS4 holders upon their request.
- Conduct weekly joint inspections with contractor/subcontractor.
- Complete an inspection report after each inspection.

SWPPP - II. Project Site Description

- Description of site conditions
- Estimate of total area disturbed
- Soil associations and estimated SCS runoff curve number
 - The SCS number is an approximation of the percent of water runoff.
 - Large value more runoff, more erosion potential
- Directory of Site map requirements location
- Outlet locations for the project

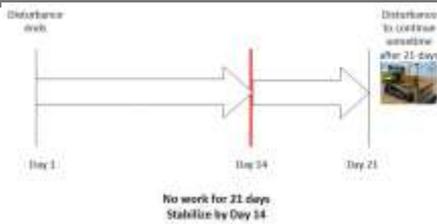
SWPPP - III. Controls – Stabilization Practices

- Actual quantities may vary from base PPP
- Amendments documented through Field Book entries or contract modification
- Additional measures may be required by inspector and/or contractor
- Preserve existing vegetation where practical and stabilize disturbed areas

SWPPP - III. Controls – Stabilization Practices

- Stabilizing measures shall be initiated as soon as practical where construction activities have temporarily or permanently ceased
- Temporary stabilizing practice shall be completed as disturbed areas are constructed
 - If construction activities are not planned for at least 21 days, stabilized by day 14

SWPPP - III. Controls – Stabilization Practices 21-14 Day Rule, p. 149



- Tracking slopes is a technique to reduce erosion potential
 - p. 25, field guide

SWPPP - III. Controls – Stabilization Practices Location

ESTIMATED QUANTITIES	
ITEM NO.	DESCRIPTION
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SWPPP - III. Controls – Structural Practices

Location

- Estimated Project Quantities
 - C Sheets, 100-1A
- Estimated Reference Information
 - C Sheets, 100-4A
- Item specific tabulations
 - C Sheets
- Typical sections
 - B sheets
- Standard Road Plans
- For designers - Design Manual Ch. 10C-1

SWPPP - III. Controls – Other Controls

- NPDES GP #2
 - Preservation of topsoil
 - Topsoil remain on-site
 - No depth requirement
- For Iowa DOT Topsoil Policy:
 - May be project specific
 - Standard Specification 2105
 - Min. 4-in depth or as noted in contract docs
 - Preferred 8 in.

SWPPP - III. Controls – Other Controls

- Disposal of unused construction materials and wastes
 - Comply with applicable state and local waste disposal, sanitary sewer, or septic system regulations



SWPPP - III. Controls – Other Controls

- Construct and maintain entrances/exits to prevent tracking of sediments offsite
- Standard Design Detail 570-10



Photograph YTC-2: A vehicle tracking control pit with wheel wash station. Photo courtesy of T&E.com



Photograph YTC-1: A vehicle tracking control pit constructed with aggregate used with rubber mulch reduces off-site sediment tracking.

SWPPP - III. Controls – Other Controls



SWPPP - III. Controls – Other Controls

- Required to contain and clean-up spills
- Contractor shall designate temporary washout facilities
 - Provide directions to drivers

SWPPP - III. Controls – Other Controls





SWPPP - III. Controls – Other Controls

- Perform fueling and maintenance in accordance with all environmental laws
 - Proper storage and disposal of waste fluids
- Employ practices to prevent contamination
 - Vehicle and Equipment Cleaning
 - Vehicle fueling and Maintenance
- Ensure employees properly dispose of litter

SWPPP - IV. Maintenance Procedures

- Maintain all temporary erosion and sediment control measures, includes cleaning, repairing and replacing as needed
- Shall begin when features have lost 50% of their capacity

SWPPP - V. Inspection Requirements

- NPDES Permit requires site inspection of BMP's once every 7 calendar days
- Iowa DOT SWPPP requires joint inspection by contractor and contracting authority at least once every 7 calendar days
- More details on reports tomorrow

SWPPP - VI. Non-Storm Water Discharges

- Subsurface drains
- Use device to control outlet velocities
 - Blocks
 - Class A stone
 - Erosion stone
 - Etc.

Final Sections of SWPPP

- VII. Potential Sources of Off Right-of-Way Pollution
 - Potential sources outside of Highway ROW are beyond the scope of this PPP
 - Pollution with in the ROW will be conveyed and controlled per this PPP
- VIII – Definitions
- Certification Statement
 - Signed by designer

Summary of NPDES & PPP

- Spreadsheet located within Reference Manual
- Describes requirements from NPDES and IaDOT SWPPP by chapter, section, and part.
- Assist to tie components together.

QUESTIONS?



**IOWA DOT
ECT CERTIFICATION
INSPECTIONS AND
REPORTS**

Kerry Newbanks, Des Moines Area Community College
Michael Heller, Iowa Department of Transportation

PPP V. Inspection Requirements

- Joint inspections once every 7 calendar days
- Reports contain
 - Date of inspection
 - Summary of the scope
 - Name/qualifications of personnel
 - Rainfall amount since last inspection
 - Major observations
 - Identify corrective actions
- Iowa DOT 2602.03.L.7
 - Contractor shall mobilize to correct deficiencies within 3 working days of inspection

PPP V. Inspection Requirements

- Inspection reports shall be considered part of amended PPP
- Additional or modified controls noted during inspection shall be incorporated
- Iowa DOT 2602.03.L.7
 - Mobilize to correct deficiencies within 72 hours of inspection
- PPP
 - Begin and correct deficiencies within 3 calendar days of inspection

Inspection Requirements NPDES

- NPDES General Permit #2 Sec. IV(D)(4)(B)
 - Deficiencies or modifications completed in 7 calendar days
- Reports should be kept in a binder on-site with all other storm water documents
 - If cannot be kept on-site should be close enough to be provided to Regulatory Agency within 3 hours

Inspection Report

The image shows a screenshot of a digital inspection report form. At the top right, there is a logo for 'HOWADDT' and the text 'OF THE NORTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES'. Below the logo, there are several sections with input fields and labels, including 'Inspection Information', 'Inspection Details', and 'Inspection Results'. The form is partially filled out with text and numbers.

Inspection Report – Title Block

- Date and Time of inspection
- Project number
- County
- DNR Authorizaion number
 - Found on authorization letter from DNR after NOI is submitted
- Name of inspector
- Title of inspector

Inspection Report – Comments and Observations

- Provide Station ranges of areas inspected
 - Provide measures inspected in those areas
- Note Erosion Sediment Control Measures (ESCM) that were installed
- Areas that were stabilized
- May include references to Inspector Daily Reports (IDR) or photocopies of field notes

Inspection Report – Comments and Observations

- Record areas where land disturbing activities ceased temporarily or permanently
- Every effort should be made to access all points of the site
 - Note any areas or controls unable to access and reasons
- Document suspension of inspections and reasons for suspension

Inspection Report – Deficiencies Found

- Note new ESCM's needed
- Note existing ESCM's that need correction or maintenance
- Detailed location information
 - Sta., Lt, Rt, Med, etc.
- Note areas where stabilization is needed
- Annotate any housekeeping issues
- Issues of non-compliance

Inspection Report – Contractor Notification

- Date and time of notification
- Type of notification
 - E-mail
 - Telephone (call or fax)
 - Direct
 - Written order

Inspection Report – Corrective Actions

- Date and time of completed
- Type of correction performed
- Within three days of inspection

Conducting an Inspection – Ch. 4

- A proper inspection includes observing all controls and may take time
 - A “drive-by” may not be adequate
- Plan your Inspection
 - Consistency



Conducting an Inspection – Ch. 4

- Inspect discharge point(s) and downstream, off-site areas
 - Walk downstream
 - Walk down street
- Inspect perimeter, slope, and ditch controls
 - Look for rills, evidence of bypass, washing of ditch bottom
 - Structural integrity of BMP, look if BMP effective (filling up, overrun, undermined)
 - Inspect Stabilization measures for consistency

Conducting an Inspection – Ch. 4



Conducting an Inspection – Ch. 4

- Compare BMPs in plans with construction conditions
 - Evaluate installation and maintenance
 - Look for areas where BMPs are needed and not in PPP
 - Check for water entering project site, run-on
 - Watch for washouts around culvert headwalls or bridge wingwalls
 - Check outlets and waterways for sedimentation

Conducting an Inspection – Ch. 4

- Inspect construction site entrances
 - Check if there is tracking of sediment from site
 - Sweep street as needed
- Inspect Sediment controls
 - Remove sediment when capacity is reduced by 50%
- Inspect Erosion control
 - Check seeding for growth
 - Reseed sparse or washed out areas
 - Weed growth not considered stabilization

Conducting an Inspection – Ch. 4

- Inspect Pollution Prevention and Good Housekeeping Practice
 - Trash areas
 - Material storage and staging areas
 - Verify concrete washout
 - Vehicle/equipment fueling and maintenance areas
- Provide specific information on deficiencies

Amending the Storm Water Pollution Prevention Plan (SWPPP) – Ch. 4 p. 135

- The base site map and PPP is amended
 - Plan revisions
 - Contract modifications
 - Field book entries (Inspector Daily Report, IDR's)
 - Progress payments of completed erosion control work
- For DNR or EPA inspectors may need to make "Item History to Date" reports available
- Electronic updates to PPP do not take the place of weekly inspection reports

What does it mean to Update PPP

- Changes to design
 - Move a BMP
 - Add a BMP
 - Modify a BMP
- Maintenance performed
 - When occurred
 - Type of work – replace, cleanout, etc.
- This can be done in Field Manager or separate reporting practice

How to Implement It – Early Steps

- Ensure perimeter controls are in place before land disturbing activities take place
- Weekly inspections
 - when and who
- Coordination with the Contractor is vital
- Timing of erosion and sediment control installation goes hand in hand with staging and work plan
- PPP is part of contract documents
 - Contractor is obligated to fulfill the responsibilities of the PPP and adhere to the NPDES permit

Noncompliance – Ch. 4

- If contractor fails to maintain controls
- Fails to mobilize within
 - 72 hours of written order
 - 8 hours of emergency order
- Performs poor quality work
- Does not complete work in timely manner

Noncompliance – Ch. 4

- A noncompliance notice can be issued
- Other Options
 - No more opening ground
 - Penalties for not mobilizing
 - Shut down
- Field Guide, p. 146 -147 is list of common compliance issues seen by EPA



Winter shutdown – Ch. 4 p. 148 - 151

- Every effort shall be made to ensure all BMP's are in place
- Snow cover is a good temporary stabilization measure
- Melting snow and ice cause for erosion
- Ensure BMPs in place before snow flies
- Weekly Inspections to continue
 - If large amounts of snow cover prevent proper inspection, must be documented that attempt to inspect was made

Notice of Discontinuation – Ch. 4

- Ensure all disturbed areas have been stabilized with permanent seeding and have achieved 70% growth
 - No project is considered complete until vegetation is established and ditches are stable
- Ensure all permanent storm water features are in place
- All temporary storm water features are removed (or plan in place for removal)

Notice of Discontinuation – Ch. 4

- Culvert inlets should be stabilized, vegetated, and show no gullies
- Make sure banks and ditch bottoms are vegetated
- Fill, grade, and seed all temporary sediment traps
- Submitted by RCE to Office of Construction within 20 days following “final stabilization”

Notice of Discontinuation – Ch. 4

- Final Stabilization
 - all soil disturbing activities have been completed
 - a uniform perennial vegetative cover with a density of 70% for the project site or equivalent stabilization measures have been employed
 - “Field Guide”, p. 154
 - Notice of Discontinuation Form, p. 156

QUESTIONS?
