

SECTION 800

**EROSION
CONTROL
AND
STORMWATER
MANAGEMENT**

STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
CITY OF MANITOWOC, WISCONSIN

SECTION 800

EROSION CONTROL AND STORMWATER MANAGEMENT

<u>Section Number</u>	<u>Title</u>
801	GENERAL
802	STANDARD METHODS OF EROSION AND SEDIMENT CONTROL

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CITY ENGINEER'S
APPROVAL _____

Valerie Thelton, P.E.

SECTION 800 - EROSION CONTROL AND STORMWATER MANAGEMENT

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801 - GENERAL

- 801.1 Conformance with Chapter 29 of Municipal Code
All Public Works construction shall conform to the requirements of Chapter 29 of the Municipal Code of the City, which concerns erosion and sediment control.
- 801.2 Scope of Work
This work shall consist of providing all labor, equipment, materials, supervision, tools, supplies, and incidentals required to control and minimize soil erosion and discharge of sediment from the construction site to adjacent lands, streams, lakes, ponds, roadways, and underground public utilities, as specified on the plans, contract documents, in this standard specifications or as directed by the Engineer.
- 801.3 General
The Engineer shall direct that projects meet the following specifications when they may impact upon the discharge of sediments to a body of water or to other lands.
- 801.4 Plans
Where erosion and sediment control plans have been prepared by the Engineer and made a part of the Contract Documents, they shall specify the type of erosion and sediment control desired for the project. This shall not, however, relieve the Contractor of his responsibility to minimize soil erosion and sediment transfer on the project during construction.
- If erosion and sediment control plans are not included in the Contract Documents, the Contractor shall install those features needed to control and minimize soil erosion and sediment transfer on the project during construction to the requirements of the contract documents, the standard specifications, as well as federal, state and local regulation.
- 801.5 Facility Maintenance
The Contractor shall inspect all erosion and sediment control facilities to assure that they are functioning as designed and that sediment has not caused a failure or accumulated in excess of 50% of the available intended design storage of the facilities. The Contractor shall be responsible to note any failures or over-burdening of the facilities, and if such an occurrence exists, the Contractor shall immediately make repairs.
- The Contractor shall be responsible for any discharge from the site due to lack of maintenance or other causes. He shall immediately clean up any material discharged from the site and make repairs or restore the area. Any and all damage, fines or penalties levied against the City shall be the responsibility of the Contractor. Such expenses shall be calculated through a withholding of progress payments.
- 801.6 Basis of Payment - General
Erosion and sediment control shall be bid as a unit price per bid item.

802 - STANDARD METHODS OF EROSION AND SEDIMENT CONTROL

The following are standard methods of temporary soil erosion and sediment control that can be used by the Contractor, or may be specified in the Contract Documents, to minimize soil and sediment transfer from the project area. Other methods may be specified in the Contract Documents due to special conditions of the project area. Installation shall in all cases conform to the "Wisconsin Construction Site Best Management Practice Handbook," "Wisconsin Department of Transportation Erosion Control Product Acceptability Lists," and "Wisconsin Department of Natural Resources Construction Site Erosion & Sediment Control Technical Standards," latest editions.

802.1 Erosion Mat

802.1.1 Scope of Work

The work under this section shall consist of furnishing, placing and maintaining a layer of erosion mat on seeded areas of the project site to control erosion at locations designated on the plans, in the Contract Documents, in this specification or as directed by the Engineer.

802.1.2 Materials

The erosion mat shall conform to Wisconsin Department of Transportation Erosion Control Product Acceptability Lists.

802.1.3 Construction Standards and Methods

Installation of erosion mat shall be in accordance with manufacturers specifications, except as follows:

1. Roll material shall be a minimum of 6 feet wide.
2. Mats shall overlap a minimum of 3 inches and anchor with anchoring devices.

802.1.4 Maintenance

The Contractor shall maintain the erosion mat and make satisfactory repairs of any areas damaged by erosion, traffic, or other causes until acceptance of the work.

802.1.5 Method of Measurement/Basis of Payment

METHOD OF MEASUREMENT - Shall be per square yard installed.

BASIS OF PAYMENT - Shall be as measured above and paid for per the Contract Unit Price for Erosion Mat. Said payment shall be full and complete compensation for the furnishing of all labor, equipment, materials, supervision, tools, supplies, and incidentals required to furnish and transport materials, place, anchor, and maintain the erosion mats including; replacement of failed units, removal and proper disposal of all erosion and sediment control materials upon acceptance of the growth of ground cover, and restoration of area disturbed by the removal of erosion and sediment control facilities.

802.2 Silt Fence

802.2.1 Scope of Work

The work under this section shall consist of furnishing, installing, maintaining, and removing and disposing of silt fence as designated on the plans, in the Contract Documents, in this specification, or as required by the Engineer.

802.2.2 Maintenance

Silt fences shall be inspected weekly and within 24 hours after a rainfall event of 0.5 inches or greater. Inspections shall be daily during prolonged rainfall events. Any required repairs or sediment removal shall be done immediately. An erosion controlled inspection log shall be maintained and available for review immediately upon request throughout the term of the project.

Sediments shall be removed when the build-up exceeds approximately ½ the volume capacity of the silt fence.

802.2.3 Construction Standards and Methods

Silt fence shall be erected in accordance with Wisconsin Department of Natural Resources Technical Standard 1056.

The Contractor shall erect the silt fence prior to the beginning of construction operations that might cause erosion at the site of the proposed silt fence.

802.2.4 Materials

Silt fence fabric shall conform with Section 628.2.6.1 of Wisconsin Department of Transportation Standard Specifications for Highway and Bridge Construction.

802.2.5 Method of Measurement/Basis of Payment

METHOD OF MEASUREMENT - Shall be per lineal foot of silt fence installed, maintained, and removed.

BASIS OF PAYMENT - Shall be as measured above and paid for per the Contract Unit Price for Silt Fence. Said payment shall be full and complete compensation for the furnishing of all labor, equipment, materials, supervision, tools, supplies, and incidentals required to furnish and transport materials, excavate, trench, place, anchor, and maintain the silt fence including; repair or replacement of failed sections, removal of sediment, removal and proper disposal of all erosion and sediment control materials upon acceptance of growth of ground cover, and restoration of area disturbed by the removal of erosion and sediment control facilities.

802.3 Erosion Bales

802.3.1 Scope of Work

The work under this section shall consist of furnishing, installing, maintaining, and removing and disposing of erosion bales as designated on the plans, in the Contract Documents, in this specification, or as directed by the Engineer.

802.3.2 Maintenance

Erosion bales shall be inspected weekly and within 24 hours after a rainfall event of 0.5 inches or greater. Inspections shall be daily during prolonged rainfall events. Any required repairs or sediment removal shall be done

immediately. An erosion controlled inspection log shall be maintained and available for review immediately upon request throughout the term of the project. They shall not be used for more than 3 months without replacement of all bales.

Sediment deposits shall be removed when the level of deposition reaches approximately one-half the height of the barrier.

Any sediment deposits remaining in place after the erosion bales is no longer required shall be dressed to conform to the existing grade and restored with seed, fertilizer, and mulch or as directed by the Engineer.

802.3.3 Construction Standards and Methods

Erosion Bales shall be erected in accordance with Wisconsin Department of Natural Resources Technical Standard 1055.

The Contractor shall erect the erosion bales prior to the beginning of construction operations that might cause erosion at the site of the proposed erosion bales.

802.3.4 Materials

Erosion bales shall be composed of hay, straw, or other suitable material.

802.3.5 Method of Measurement/Basis of Payment

Unit Price Bid Item

METHOD OF MEASUREMENT - Shall be per unit of erosion bales installed.

BASIS OF PAYMENT - Shall be as measured above and paid for per the Contract Unit Price for Erosion Bales. Said payment shall be full and complete compensation for the furnishing of all labor, equipment, materials, supervision, tools, supplies, and incidentals required to furnish and transport materials, excavate, trench, place, anchor, and maintain the erosion bales including; replacement of failed units, removal of sediment, and proper disposal of all erosion and sediment control materials upon acceptance of growth of ground cover, and restoration of area disturbed by the removal of erosion and sediment control facilities.

802.4 Tracking Pad

802.4.1 Scope of Work

The work under this section shall consist of constructing a stabilized pad of stone aggregate. The tracking pad shall be located where traffic enters or leaves the construction site to or from a public right-of-way, street, alley, or parking area and shall be as designated on the plans, in the Contract Documents or as required by the Engineer. Access to any site must be restricted to only locations that contain a functioning tracking pad.

802.4.2 General

The purpose of a tracking pad is to reduce or eliminate the tracking of sediment onto public rights-of-way, streets, alleys, parking areas, etc..

A stabilized construction entrance shall be used at all points of construction egress.

Access points to construction sites shall be restricted by use of Type III barricades, silt fencing, or safety fencing. An opening shall be left across the width of the tracking pad for access.

802.4.3 Materials

Aggregate for tracking pad shall be 3” to 6” clear washed stone. All material to be retained in a 3-inch sieve. A 3” clear washed round stone is the optimal material.

802.4.4 Construction

Thickness - Twelve (12) inches or greater.

Width - The full width of the egress point but in all cases must be a minimum of twenty (20) feet wide.

Length – Fifty (50) feet or greater.

802.4.5 Maintenance

The tracking pad shall be maintained in a condition, which will prevent tracking of sediment onto public rights-of-way or streets. This may require the top several inches of aggregate being removed and replaced.

Sediment spilled, dropped, or washed onto public rights-of-way must be removed immediately. A complete sweeping of the roadway must be accomplished after every workday.

Wheels must be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with aggregate that drains into a approved sediment-trapping device. No sediment shall be allowed to enter storm sewers, ditches, or other watercourses.

802.4.6 Method of Measurement/Basis of Payment

METHOD OF MEASUREMENT - Shall be per unit installed.

BASIS OF PAYMENT - Shall be as measured above and paid for per the Contract Unit Price for Tracking Pad. Said payment shall be full and complete compensation for the furnishing of all labor, equipment, materials, supervision, tools, supplies, and incidentals required to furnish, transport, and install materials, including stone, filter cloth, piping, fencing, and barriers; excavate, trench, place, and maintain the tracking pad; repair or replace the tracking pad; remove and properly dispose of all erosion and sediment control materials upon acceptance of growth of ground cover; and restore the area disturbed by the removal of erosion and sediment control facilities.

802.5 Inlet Protection

802.5.1 Scope of Work

The work under this section shall consist of providing measures to prevent sediment from entering the storm sewer system via existing inlets or catch basins.

802.5.2 General

Inlet protection is intended to intercept, pond, and filter sediment laden runoff

until contributing drainage area has been stabilized.

802.5.3 Materials

The inlet protection fabric shall be a Type FF material as specified in the "WIDOT Standard Specifications for Highway Structures" and must be selected from the approved list of fabrics in the current edition of the Wisconsin Department of Transportation Erosion Control Product Acceptability List.

802.5.4 Construction

1. Type A: Shall be used around field inlets until permanent stabilization methods have been established.
2. Type B: Shall be used on street inlets without curb head, once surrounding surfaces are in place.
3. Type C: Shall be used on street inlets with curb heads. A 1-1/2" x 3-1/2" piece of wood shall be wrapped and secured in the fabric and placed in front of the curb head as shown on the plans. The wood shall not block the entire opening of the curb box.
4. Type D: (silt sack) Shall be utilized for long-term sediment control on unpaved roadways.

802.5.5 Maintenance

Inlet Protection shall be inspected weekly and within 24 hours after a rainfall event of 0.5 inches or greater. Inspections shall be daily during prolonged rainfall events. Any required repairs or sediment removal shall be done immediately. An erosion controlled inspection log shall be maintained and available for review immediately upon request throughout the term of the project.

Sediment deposits shall be removed and inlet protection devices restored to original dimensions when sediment has accumulated to 1/2 of design depth of the device or when the device no longer functions. Any foreign material falling into the inlet shall be removed.

802.5.6 Method of Measurement/Basis of Payment

METHOD OF MEASUREMENT - Shall be per unit installed.

BASIS OF PAYMENT - Shall be as measured above and paid for per the Contract Unit Price for Inlet Protection. Said payment shall be full and complete compensation for the furnishing of all labor, equipment, materials, supervision, tools, supplies, and incidentals required to furnish, place, anchor, and maintain inlet protection measures including; replacement of failed units, removal of sediment, removal and proper disposal of all erosion and sediment control materials upon acceptance of growth of ground cover, and restoration of area disturbed by the removal of erosion and sediment control facilities.

- END OF SECTION 800 -

SECTION 800

EROSION CONTROL AND STORMWATER MANAGEMENT

Details

STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION
CITY OF MANITOWOC, WISCONSIN

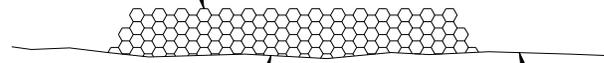
SECTION 800

EROSION CONTROL AND STORMWATER MANAGEMENT

DETAILS

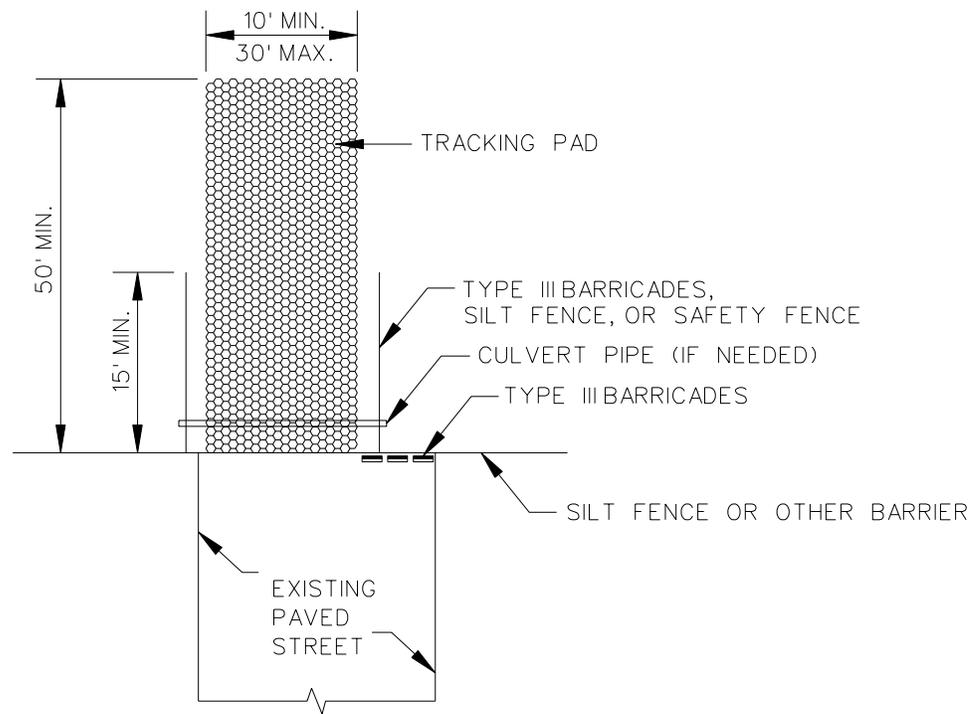
<u>Detail Number</u>	<u>Title</u>
801	Stabilized Construction Entrance (Tracking Pad)
802	Inlet Silt Sack Installation
803	Silt Fence Installation
804	Typical Installation of Erosion Bales and Temporary Ditch Checks
805	Inlet Protection Type A, B, and C

2" TO 3" ROUND STONE
12" MINIMUM DEPTH



FILTER FABRIC
REQUIRED AT UNSTABLE LOCATIONS

EXISTING GROUND



10' MIN.
30' MAX.

TRACKING PAD

50' MIN.

15' MIN.

TYPE III BARRICADES,
SILT FENCE, OR SAFETY FENCE

CULVERT PIPE (IF NEEDED)

TYPE III BARRICADES

SILT FENCE OR OTHER BARRIER

EXISTING
PAVED
STREET

NO SCALE

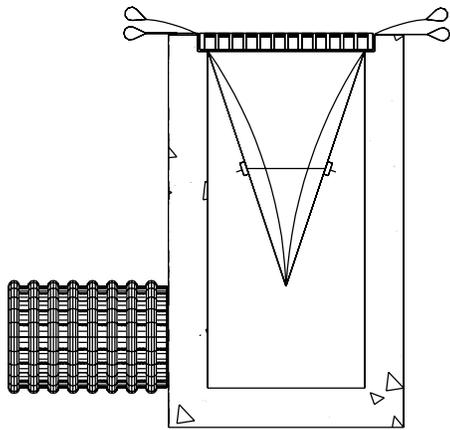
STABILIZED CONSTRUCTION ENTRANCE (TRACKING PAD)



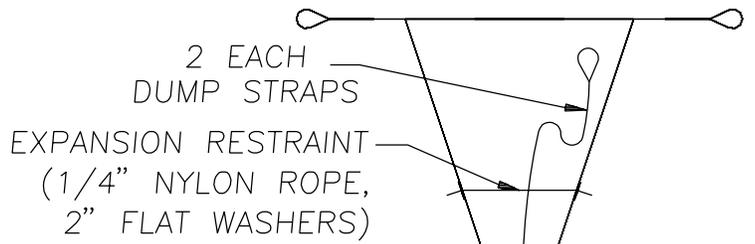
City of Manitowoc
ENGINEERING DEPARTMENT

Rev. 1/07

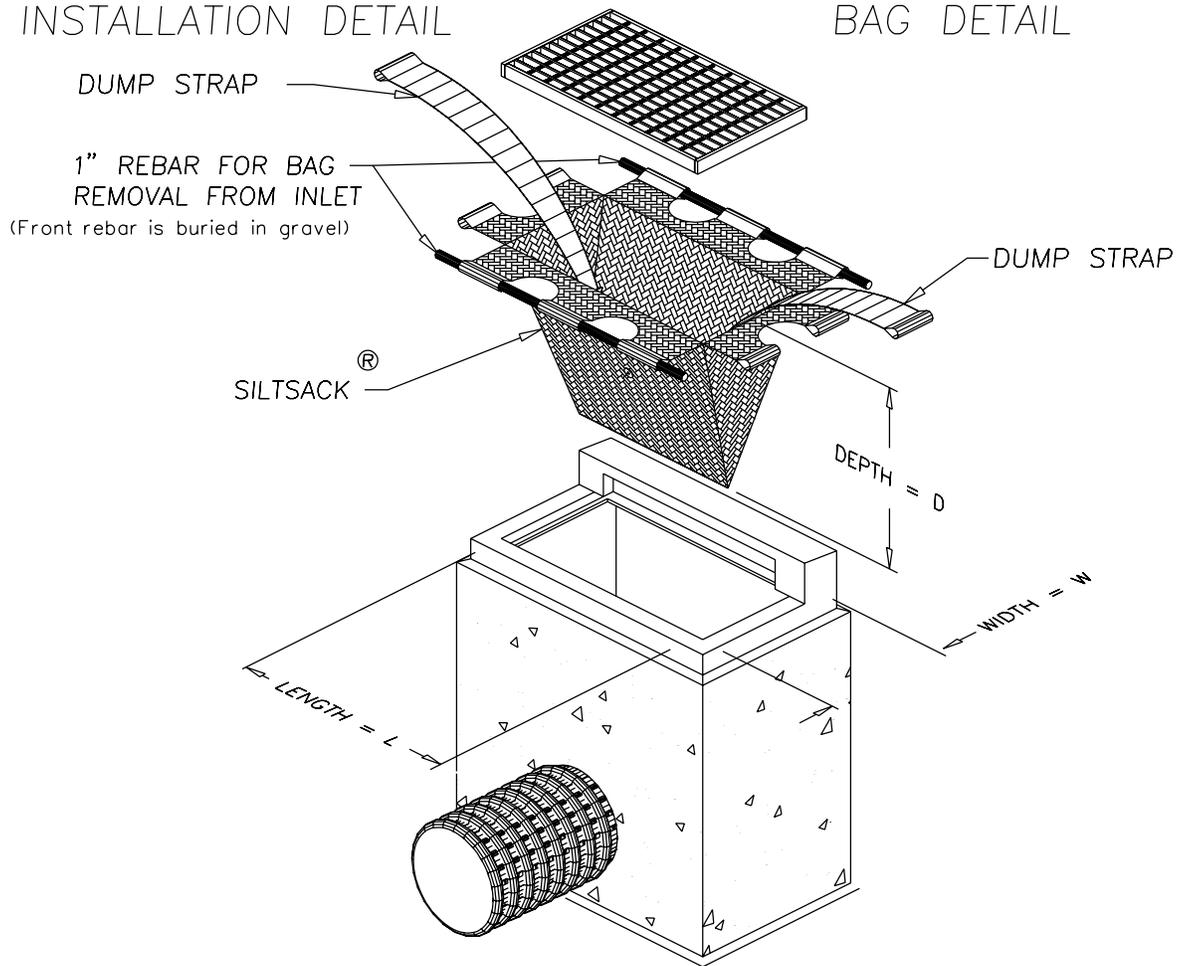
FORM NO.
801



INSTALLATION DETAIL



BAG DETAIL



NO SCALE

INLET SEDIMENT CONTROL DEVICE
(SILT SACK)



City of Manitowoc
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802

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SILTSACK®

SPECIFICATIONS

NOTE: THE SILTSACK® WILL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS.

REGULAR FLOW SILTSACK®

(FOR AREAS OF LOW TO MODERATE PRECIPITATION AND RUN-OFF)

PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	300 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	120 LBS
MULLEN BURST	ASTM D-3786	800 PSI
TRAPEZOID TEAR	ASTM D-4533	120 LBS
UV RESISTANCE	ASTM D-4355	80 %
APPARENT OPENING SIZE	ASTM D-4751	40 US SIEVE
FLOW RATE	ASTM D-4491	40 GAL/MIN/SQ FT
PERMITTIVITY	ASTM D-4491	0.55 SEC -1

HI-FLOW SILTSACK®

(FOR AREAS OF MODERATE TO HEAVY PRECIPITATION AND RUN-OFF)

PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	265 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	135 LBS
MULLEN BURST	ASTM D-3786	420 PSI
TRAPEZOID TEAR	ASTM D-4533	45 LBS
UV RESISTANCE	ASTM D-4355	90 %
APPARENT OPENING SIZE	ASTM D-4751	20 US SIEVE
FLOW RATE	ASTM D-4491	200 GAL/MIN/SQ FT
PERMITTIVITY	ASTM D-4491	1.5 SEC -1

OIL-ABSORBANT SILTSACK®

(FOR AREAS WHERE THERE IS A CONCERN FOR OIL RUN-OFF OR SPILLS)

DEPENDING ON YOUR PARTICULAR APPLICATION, THE SILTSACK® CAN BE MADE FROM EITHER ONE OF THE ABOVE FABRICS WITH AN OIL-ABSORBANT PILLOW INSERT OR, MADE COMPLETELY FROM AN OIL-ABSORBANT SILTSACK®, WITH A WOVEN PILLOW INSERT.

INLET SEDIMENT CONTROL DEVICE
(SILT SACK)



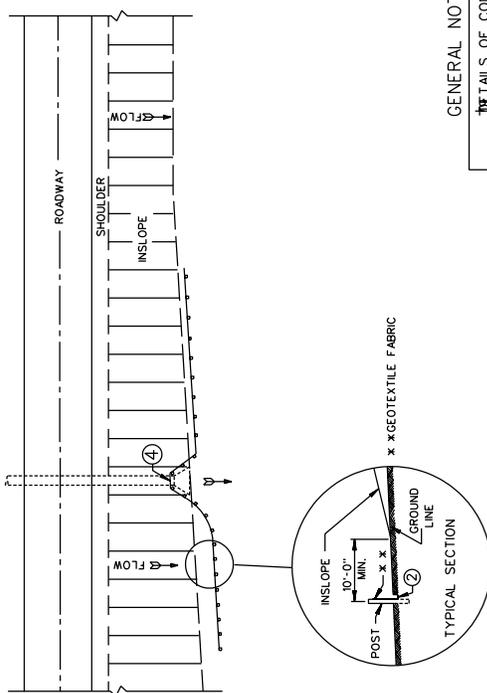
City of Manitowoc
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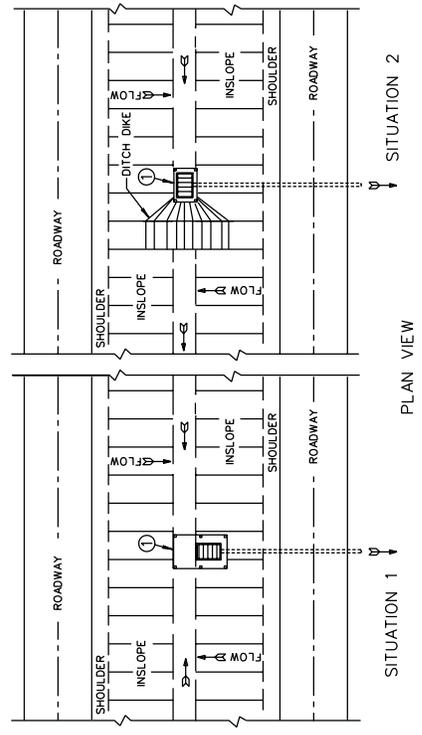
FORM NO.

802

(2 of 2)



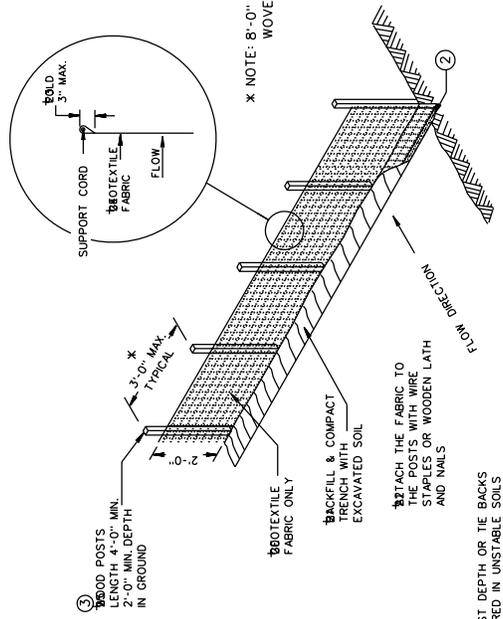
PLAN VIEW
TYPICAL APPLICATION OF SILT FENCE



PLAN VIEW
SILT FENCE AT MEDIAN SURFACE DRAINS

GENERAL NOTES

- DETAILS OF CONSTRUCTION NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPLICABLE SPECIAL PROVISIONS.
- ① HORIZONTAL BRACE REQUIRED WITH 2" X 4" WOODEN FRAME OR EQUIVALENT AT TOP OF POSTS.
 - ② BENCH SHALL BE A MINIMUM OF 4" WIDE & 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC. FOLD MATERIAL TO FIT TRENCH AND BACKFILL & COMPACT TRENCH WITH EXCAVATED SOIL.
 - ③ WOOD POSTS SHALL BE MINIMUM SIZE OF 1 1/8" X 1 1/8" OF OAK OR HICKORY.
 - ④ SILT FENCE TO EXTEND ACROSS THE TOP OF THE PIPE.



* NOTE: 8'-0" POST SPACING ALLOWED IF A WOVEN GEOTEXTILE FABRIC IS USED.

NOTE: ADDITIONAL POST DEPTH OR TIE BACKS MAY BE REQUIRED IN UNSTABLE SOILS

SILT FENCE

SILT FENCE TIE BACK
(WHEN REQUIRED BY THE ENGINEER)

SILT FENCE INSTALLATION

NO SCALE

City of Manitowoc
ENGINEERING DEPARTMENT

Rev. 4/05

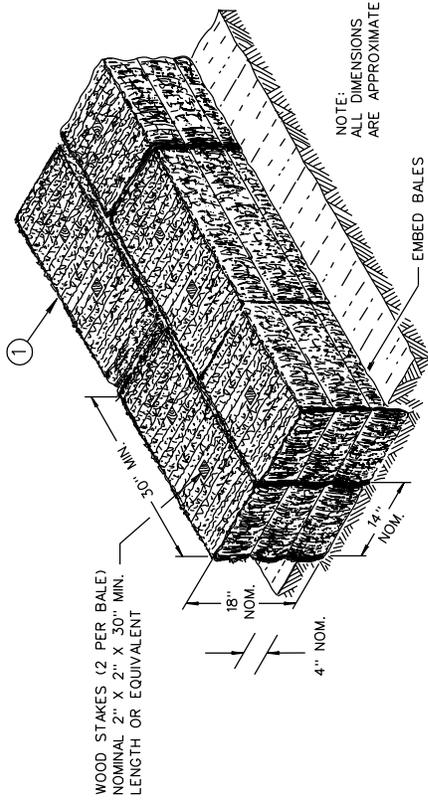
FORM NO.
803

GENERAL NOTES

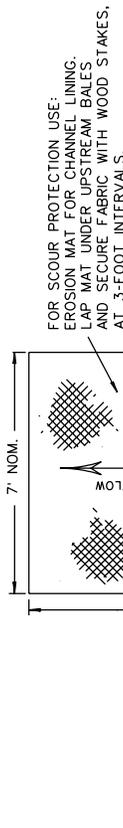
DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

TEMPORARY DITCH CHECKS EITHER EROSION BALES OR MANUFACTURED SHALL BE PAID FOR UNDER THE BID ITEM OF EACH BALE INSTALLED.

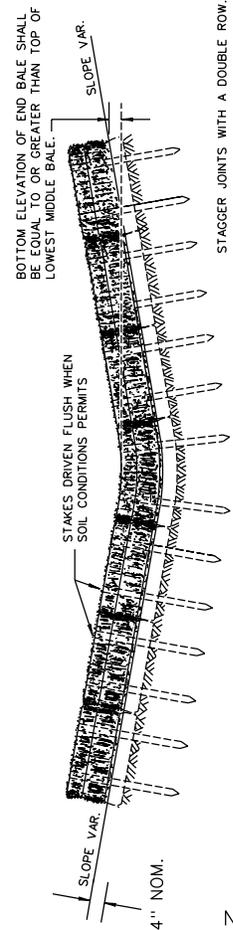
① CONTRACTOR REQUIRED TO INSTALL ONE ROW OF BALES UNLESS ENGINEER DETERMINES OTHERWISE.



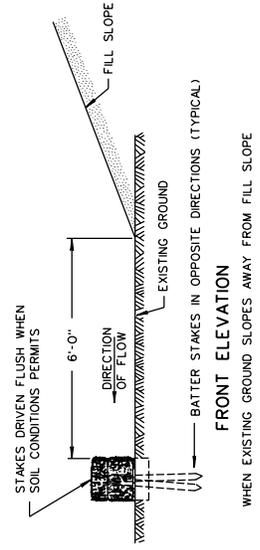
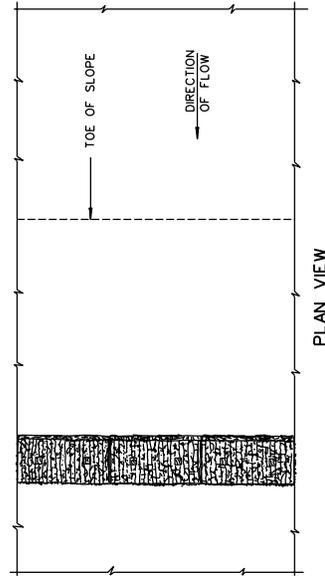
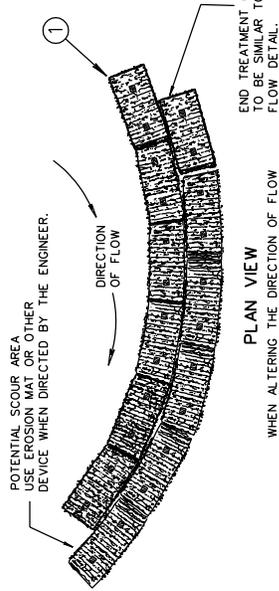
SECTION A-A



PLAN VIEW



FRONT ELEVATION
TEMPORARY DITCH CHECK USING EROSION BALES



EROSION BALES FOR SHEET FLOW

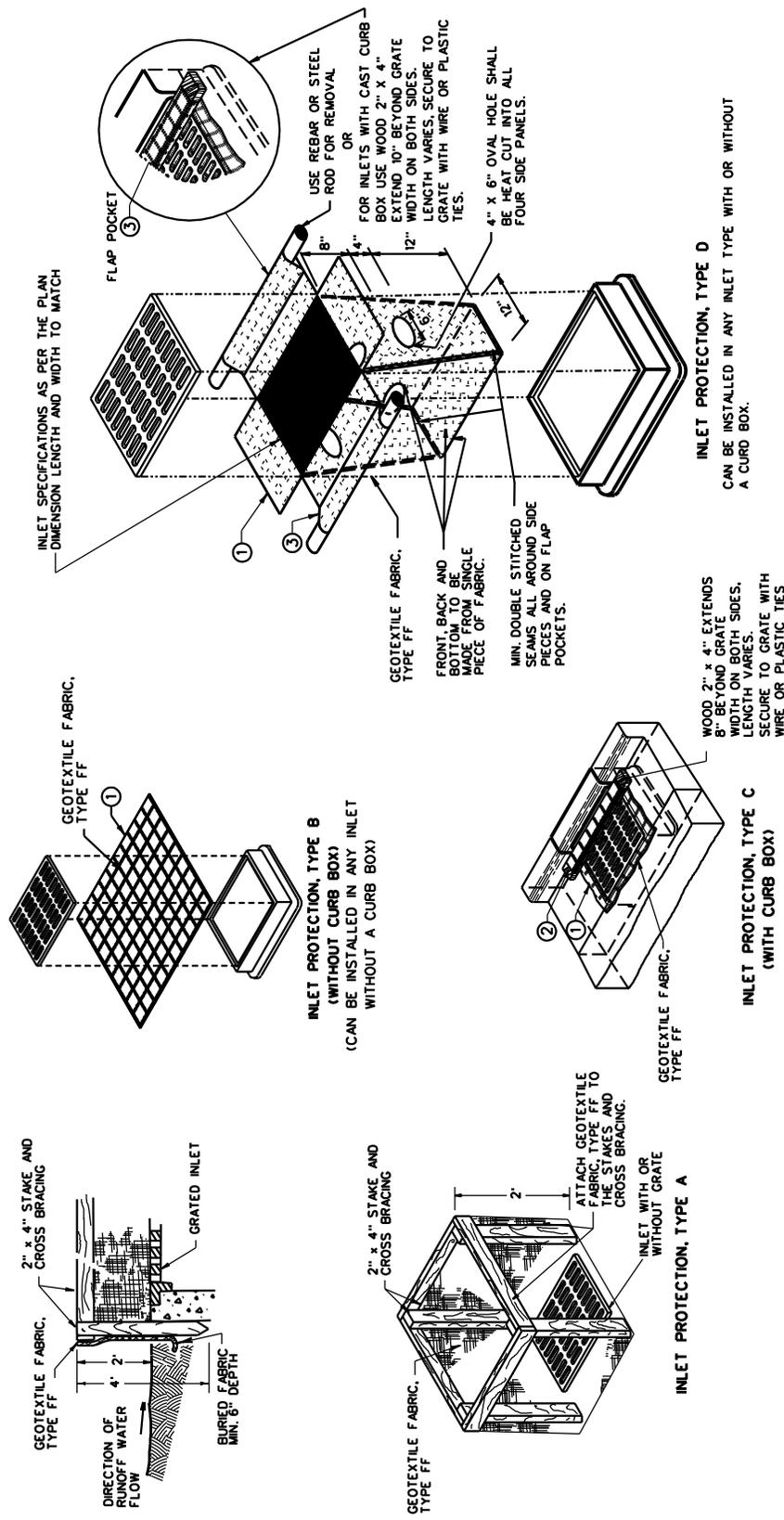
INSTALLATION OF EROSION BALES
AND TEMP. DITCH CHECKS



City of Manitowoc
ENGINEERING DEPARTMENT

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804



INSTALLATION NOTES

TYPE B & C

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE. THE CONTRACTOR SHALL DEMONSTRATE A METHOD OF MAINTENANCE, USING A SEWN FLAP, HAND HOLDS OR OTHER METHOD TO PREVENT ACCUMULATED SEDIMENT FROM ENTERING THE INLET.

TYPE D

DO NOT INSTALL INLET PROTECTION TYPE D IN INLETS SHALLOWER THAN 30" MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE. TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE. THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OR 3", WHERE NECESSARY THE CONTRACTOR SHALL CINCH THE BAG, USING PLASTIC ZIP TIES TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.

GENERAL NOTES

INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER.
 MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE DEPARTMENT'S EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.
 WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

- ① FINISHED SIZE, INCLUDING FLAP POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.
- ② FOR INLET PROTECTION, TYPE C (WITH CURB BOX), AN ADDITIONAL 18" OF FABRIC IS WRAPPED AROUND THE WOOD AND SECURED WITH STAPLES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB BOX OPENING.
- ③ FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" x 4".

NO SCALE

**INLET PROTECTION
 TYPE A, B, C, AND D**

City of Manitowoc
 ENGINEERING DEPARTMENT

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805