Project Manual for:

Eagle Spring Lake Management District (ESLMD)
Eagle Spring Lake
Kroll Dam Upgrades

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Prepared for

Mr. Tom Day
Eagle Spring Lake Management District
&
Michelle Schneider, PE
Water Management Engineer
Wisconsin Dept. of Natural Resources

Kroll Dam Upgrades

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INVITATION TO BID

PROJECT: Eagle Spring Lake
Kroll Dam Upgrades

BID DEADLINE: (deadline)

Sealed bids for the above project will be received by Eagle Spring Lake Management District at PO Box 196, Eagle, WI 53119 until the Bid Deadline.

Bids will be opened in private.

In general the project consists of

The addition of a 48" RCP culvert from the Kroll Dam on Eagle Spring across CTH E to the discharge point of the existing 30" RCP culvert. Work will include, but is not limited to, road replacement, traffic control, culvert installation, and restoration.

A pre-bid meeting to examine the project site will be held on _____ at _____ a.m. Meet at _____.

A single prime bid will be received for the work.

Bid security in the amount of 5% of the maximum bid amount must accompany each bid and may not be withdrawn for a period of 45 days after the Bid Deadline.

100% Performance and Payment Bonds will be required during the project.

State and Federal prevailing wage rates are applicable to this project.

Owner reserves the right to reject any or all bids, to waive informalities in any bid, and to accept any bid which Owner may determine to be in its best interest.

Bidding documents may be examined at Builders Exchanges in Milwaukee, at the Bid+ Network in Madison, WI; at the Dodge Plan Rooms in Milwaukee and Minneapolis; and through the electronic plan rooms of McGraw Hill Construction/Dodge and Reed Construction Data.

Bidding documents may be obtained from Ayres Associates, 3433 Oakwood Hills Parkway, Eau Claire, WI 54701-7698, 715.834.3161, upon deposit of $50.00 per set, plus a separate nonrefundable handling fee of $20.00. Deposits will be refunded upon return of documents in good condition within 15 days following the Bid Deadline.

Bidding documents may be obtained:

- In Adobe Acrobat® electronic format by download from the Quest Construction Data Network website, http://www.questcdn.com, for $10.00. Enter eBidDoc™ #_____ on the "Search Projects" page.
- In paper format from Ayres Associates, 3433 Oakwood Hills Parkway, Eau Claire, WI 54701-7698, 715.834.3161, upon payment of $50.00 per set. Payment will not be refunded.

Bidding documents will be available _____.

By:

SECTION 01 01 00

GENERAL REQUIREMENTS

1.01 PROJECT DESCRIPTION

A. In general, the project involves

There are two outlet structures at Eagle Spring Lake Wambold Dam, and Kroll Dam. A dam failure analysis was completed for the Wambold Dam in 2001. The results of the analysis concluded that the dam is a significant hazard and is required to pass the 500-year flood. The dam does not currently have the required spillway capacity. In 2006, the Eagle Spring Lake Management District (ESLMD) hired Ayres Associates to perform a spillway capacity analysis and evaluate a means of achieving the required capacity.

The addition of a 48” RCP culvert from the Kroll Dam on Eagle Spring across CTH E to the discharge point of the existing 30” RCP culvert. Work will include, but is not limited to, road replacement, traffic control, culvert installation, and restoration.

B. The project is located at the Kroll Dam on Eagle Spring Lake.

1.02 CONTRACTS

A. A Single Prime Contract will be awarded.

1.03 WORK BY OTHERS

A. Eagle Spring Lake Management District

1.04 OWNER-FURNISHED PRODUCTS

A. None.

1.05 WORK SEQUENCE

A. Contractor shall supply a written work sequence and schedule.

In general the work sequence shall be:

CONSTRUCTION SEQUENCING:

1. INSTALL EROSION CONTROL (SEE SHEET C-1).

2 .INSTALL 48" APRON ENDWALL & RIPRAP (SEE SHEET C-1 & C-2).

3. SAWCUT ASPHALT ON CTH E (SEE SHEET C-1 & C-2).

4. REMOVE ASPHALT ON CTH E (SEE SHEET C-1 & C-2).

5. REMOVE BEAM GUARD AS NECESSARY.

6. INSTALL 48" STORM SEWER CULVERT PIPE CROSSING CTH E. INSTALL THE STORM SEWER IN HALVES. ONLY CLOSE 1-LANE AT A TIME. PROVIDE TEMPORARY STEEL PLATING. USE "TWO FLAGGER OPERATION" DURING CONSTRUCTION.

7. RE-INSTALL THE BEAM GUARD IN-KIND AND AS PER SDD 14B 15-A. SDD 14B 15-6A IS ATTACHED TO THE PLAN SET.

8. INSTALL 72" MANHOLE.

9. INSTALL STORM SEWER TO MILLRACE.

10. MAKE CONNECTION TO MILLRACE.

11. CONCRETE WORK AT THE KROLL DAM PIER.

1.06 PROJECT MEETINGS

A. A preconstruction conference will be scheduled after award of contract and prior to beginning work. This meeting shall be attended by A/E, Owner, representative from the Wisconsn Department of Natural Resources (WDNR), and an authorized representative of Contractor.

B. Periodic progress meetings will be held at project site at times designated by Owner or A/E. A responsible representative of Contractor who can bind Contractor to decisions shall attend.

1.07 WORK HOURS

A. Work shall be conducted between the hours of 7:00 a.m. to 6:00 p.m. on normal work days, unless approved for unusual circumstances.

B. Give written notice to A/E whenever it is desired to perform work at night, or on a Saturday, Sunday, or holiday, or to vary period of hours during which work is carried on each day. If approved, such work shall be subject to requirements furnished in writing by A/E, and no extra compensation will be allowed.

1.08 SUBMITTALS

A. Submit items for review as listed below and as indicated in individual specification sections. Unless otherwise indicated, submit the following quantities for each type of submittal:

1. Construction Schedule: PDF electronic file or 2 paper copies.
2. Schedule of Values (if required): PDF electronic file or 2 paper copies.
3. Shop Drawings: PDF electronic file or minimum 3 paper copies (2 retained, 1 returned).
4. Product Data: PDF electronic file or minimum 3 paper copies (2 retained, 1 returned).
5. Appearance Samples: 2 samples (1 retained, 1 returned).
6. Certificates of Compliance: PDF electronic file or 2 paper copies.
7. Permits and Approvals: PDF electronic file or 1 paper copy.
8. Test Reports: PDF electronic file or 2 paper copies.
9. Operation and Maintenance (O/M) Manuals: 2 paper copies.
10. Warranties: PDF electronic file or 2 paper copies.

B. Shop drawing and product data submittals shall bear the stamp of approval of Contractor as evidence of accuracy, compatibility, and conformance with contract requirements. Drawings and product data not so stamped will be returned without being examined. Where manufacturer's standard literature includes multiple products or options, identify the specific products and options as required for this project. Specific written notice shall be given of each variation that shop drawings and product data may have from requirements of the Contract Documents.

C. Products subject to shop drawing, product data, or sample review shall not be used in the work until submittals have been reviewed and bear the stamp and signature of A/E. Submittals will only be reviewed for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Contractor shall be responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his or her work with that of all other trades, and performing all work in a safe and satisfactory manner. Corrections or comments made on submittals shall not relieve Contractor from compliance

with requirements of Drawings and Specifications and shall not be considered an order for extra work.

1.09A PERMITS AND CODES

A. Provide all necessary licenses and permits and pay all fees, taxes, and royalties, unless otherwise indicated.

B. Comply with local and municipal ordinances and applicable state and national codes.

1.09B PERMITS AND CODES

A. Owner will obtain the following permits, licenses, and approvals:

1. Wisconsin Department of Natural Resources Chapter 31 permit.
2. Waukesha County Right of Way and Roadway Crossing Work Permit

B. Contractor shall comply with the requirements of the above permits, licenses, and approvals. If a copy of a permit, license, or approval is not available for review prior to the Bid Deadline, and if it contains a requirement not covered by the Contract Documents, such a requirement will be considered extra work if Contractor makes a claim under the terms of the General Conditions. Work shall not begin on items applicable to the above until the required permit, license, or approval is received.

C. Contractor shall provide all other necessary permits and licenses and pay all fees, taxes, and royalties, unless otherwise indicated.

D. Comply with local and municipal ordinances and applicable state and national codes.

1.10 TEMPORARY UTILITIES

A. Contractor shall be responsible for providing temporary electric power as required for construction purposes. Provide portable power supply or make arrangements with local utility company.

B. Contractor shall be responsible for obtaining water for its needs. Pay cost of water used and meter rental, if applicable.

C. Contractor shall provide temporary outside toilets sufficient for construction workers. Toilets shall be self-contained chemical type and shall comply with applicable Codes. Maintain sanitary facilities in a clean and sanitary condition; supply toilet paper until completion of project.

1.11 PROTECTION

A. Furnish and maintain proper barricades, fences, signal lights, warning signs, and personnel as required to properly protect and safeguard the work, persons, animals, and property against injury.

1.12 ENVIRONMENTAL CONTROLS

A. Maintain erosion control measures to protect the project site and prevent sediment pollution of adjacent water courses and properties.

1. Install erosion control measures prior to start of construction and maintain them until final completion of work. Unless otherwise instructed, remove temporary erosion control measures prior to final application for payment.
2. Strive to limit stripping of sod and vegetation to a period that will expose bare soil to the least possibility of erosion that construction requirements allow.

3. Construct and maintain filter fabric barriers, straw bale barriers, or temporary diversions to receive runoff leaving site.
4. Protect storm drain inlets by using inlet protection of the type shown on Drawings. If not shown, use inlet protection fabric, silt fence barriers, erosion bale barriers, or equivalent.
5. Remove at the end of each work day soils and sediment reaching public or private streets not part of the construction site.
6. Unless otherwise shown or specified, erosion control measures shall comply with the WDNR "Stormwater Management Technical Standards" (available on the WDNR web site at www.dnr.state.wi.us/runoff/stormwater/techstds.htm).

B. Minimize dispersion of dust from construction operations by application of water or other dust control materials. Controls shall confine dust and dirt within the immediate area of project.

C. Provide noise control measures to limit the amount of noise and prevent nuisance. Properly equip all equipment with mufflers. Limit construction activities generating significant noise to normal working hours.

1.13 TRAFFIC CONTROL

A. Conduct operations to ensure minimum interference with streets, walks, and adjacent facilities not part of construction project.

B. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Contractor shall submit a traffic control plan to Waukesha County for approval prior to beginning work.

1.14 PRODUCT REQUIREMENTS

A. Provide new products manufactured and conditioned for the particular application as recommended by manufacturer, unless otherwise noted. Transport, handle, store, and protect products as specified and in accordance with manufacturer's recommendations.

B. Products, materials, and equipment identified by reference to a manufacturer's name, catalog number, or model are identified for the purpose of establishing a standard of quality, type, and function. Products first named in specifications are depicted for general descriptive purposes only. Any other product, material, or equipment which will perform adequately the duties imposed by the general design will be considered for substitution in accordance with the provisions below.

C. Requests for substitution of alternate products shall be submitted with complete references to manufacturer's product identification and product data indicating composition, guarantee, availability, applicable standards or agency approvals met or exceeded, restrictions imposed on product, and manufacturer's recommended method of application or installation. Substitutions will be considered acceptable if the product will perform adequately the duties imposed by the general design and, in opinion of A/E, is of equal substance, quality, appearance, and function, unless the named item is necessary for interchangeability or if the named product has been demonstrated to be most cost-effective.

1.15 SURVEYS, STAKING, LINE AND GRADE

A. Owner will provide baseline reference points and benchmarks as indicated on Drawings. Contractor shall provide all other survey staking and layout as required to complete the Work.

1.16 FIELD MEASUREMENTS AND INSPECTION OF SURFACES

A. Contractor shall layout its Work based on reference points furnished by Owner and shall be solely responsible for the accuracy of its measurements. Verify grades, lines, levels, locations, and dimensions as shown on Drawings, and inspect surfaces that are to receive work before proceeding with fabricating, assembling, fitting, or erecting. Notify A/E in writing in case of unsuitable conditions, defective substrates, or discrepancies in Contract Documents. Starting of work shall imply acceptance of conditions.

B. Correct any errors or defects due to faulty measurements, improper layout, or failure to report discrepancies.

1.17 CUTTING AND PATCHING

A. Cut new openings in existing construction as required. Employ skilled workers.

B. Restore surfaces to match adjacent finish. Waterproof and insulate holes in exterior walls. Backfill and properly compact earthwork needed to perform cutting and patching.

1.18 CONSTRUCTION CLEANING

A. Keep work area free of accumulations of surplus materials, rubbish, and debris.

1.19 PUNCH LIST

A. A "punch list" will be prepared and distributed to Contractor at Substantial Completion. Items on punch list shall be completed within 30 days. Required submittals (see below) shall be completed prior to or when requesting final payment.

1.20 CLOSEOUT SUBMITTALS

A. Submit the following items to A/E prior to or with final Application for Payment:

1. Project record drawings marked to show all changes made during construction. Dimension underground and concealed work and utilities from permanent reference points; record vertical distances. Make and record measurements to the nearest 0.5 ft on a clean drawing set.
2. State labor certification on required form indicating that prescribed wage rates have been paid on all project labor.
3. Evidence of continuing insurance coverage complying with insurance requirements (see Conditions of the Contract).
4. Contractor's affidavit, along with final releases and waivers of liens as required by Owner, indicating that all debts and claims against project (less amounts withheld by Owner) have been paid in full or otherwise satisfied.
5. Consent of surety company to final payment.

1.21 DEFINITIONS

A. Dimensions on drawings and details are subject to field measurements.

B. The term "working days" shall exclude weekends (Saturday and Sunday) and holidays.

C. References to "Division 00" shall mean the Bidding Requirements and Contracting Requirements.

D. References to "WDNR" shall mean Wisconsin Department of Natural Resources.

E. References to "WIDOT Std. Spec." shall mean Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, latest edition, including current Supplemental Specifications.

F. References to "A/E", "Architect", or "Engineer" shall mean Ayres Associates.

G. References to "Owner" shall mean Eagle Spring Lake Management District (ESLMD).

END OF SECTION

SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Provide temporary environmental controls as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

1.02 MEASUREMENT AND PAYMENT

A. Environmental control items will be considered incidental to construction and the cost of such work incidental to unit bid items, unless Bid Schedule includes separate pay items.

B. When Bid Schedule includes a unit price for SILT FENCE, payment will be made at the contract unit price per linear foot. Measurement will be along base of fence, center to center of end posts, for each section of fence. Unit price shall be full compensation for furnishing, delivering, installing, maintaining, and removing silt fence and for removal and disposal of sediment deposits.

C. When Bid Schedule includes a unit price for EROSION BALES, payment will be made at the contract unit price per linear foot. Measurement will be along length of the bales from end-to-end for each section installed. Unit price shall be full compensation for furnishing, delivering, installing, maintaining, and removing bales and for removal and disposal of sediment deposits.

D. When Bid Schedule includes a unit price for SEDIMENT LOGS, payment will be made at the contract unit price per linear foot. Measurement will be along length of the sediment logs from end-to-end for each section installed. Unit price shall be full compensation for furnishing, delivering, installing, maintaining, and removing logs and for removal and disposal of sediment deposits.

E. When Bid Schedule includes a unit price for INLET PROTECTION, payment will be made at the contract unit price for each inlet protected. Unit price shall be full compensation for furnishing, delivering, installing, maintaining, and removing inlet protection and for removal and disposal of sediment deposits.

F. When Bid Schedule includes a unit price for STONE TRACKING PAD, payment will be made at the contract unit price for each pad of the size specified or shown. Unit price shall be full compensation for furnishing, installing, maintaining, and removing tracking pad.

1.03 SUBMITTALS

A. Inspection Reports: Submit one copy of weekly inspection reports for erosion and sediment controls.

1.04 PERMITS

A. Owner will:

1. File the Chapter 31 permit with the WDNR and provide a copy of the permit conditions to the contractor to keep on-site during construction.

B. Contractor shall:

1. Comply with requirements of the Chapter 31 General Permit.
2. Keep a copy of the Chapter 31 General Permit on-site during construction.

PART 2 PRODUCTS

2.01 SILT FENCE

A. Geotextile fabric and support system complying with the requirements of WIDOT Std. Spec., Subsection 628.2.6, except geotextile fabric shall have a maximum flow rate of 10 gal/minute/sq ft at 50 mm constant head as determined by multiplying permittivity in 1/second as determined by ASTM D4491 by a conversion factor of 74.

2.02 EROSION BALES

A. Straw or weed-free hay, in good condition, with rectangular surfaces, tightly bound with twine (not wire) and nominal dimensions of 30 in. x 18 in. x 14 in.

2.03 SEDIMENT LOGS

A. Sediment logs shall consist of an exterior containment fabric filled with an interior filtering material and shall be as approved in the WIDOT Erosion Control Product Acceptability List (PAL).

2.04 INLET PROTECTION FABRIC

A. Woven polypropylene material complying with the requirements of WIDOT Std. Spec., Subsection 628.2.12.

2.05 STONE TRACKING PAD MATERIALS

A. Aggregate: 3 to 6 in. clear or washed stone. All material shall be retained on a 3 in. sieve.

B. Geotextile Fabric: WIDOT Std. Spec., Section 645, Type R fabric.

2.06 TEMPORARY SEED

A. Temporary seed mixture complying with requirements of WIDOT Std. Spec., Subsection 630.2.1.5.1.2.

2.07 PERMANENT SEED

A. See Section 32 99 10.

2.08 EROSION MAT

A. See Section 32 99 10.

PART 3 EXECUTION

3.01 EROSION CONTROL

A. Applicable Standards: Unless otherwise shown or specified, erosion control measures shall comply with:

1. "Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit" for storm water discharges associated with construction activities.
2. WDNR "Stormwater Management Technical Standards" (available on the WDNR web site at www.dnr.state.wi.us/runoff/stormwater/techstds.htm).

B. General: Maintain erosion control measures to protect the project site and prevent sediment pollution of adjacent water courses and properties. At a minimum, provide erosion control measures as indicated on Drawings.

C. Time Period: Install erosion control measures prior to start of construction and maintain them until final completion of work. Unless otherwise instructed, remove temporary erosion control measures prior to final application for payment.

D. Stripping: Strive to limit stripping of sod and vegetation to a period that will expose bare soil to the least possibility of erosion that construction requirements will allow.

E. Diversions: Construct and maintain dams, channels, flumes, sumps, and other temporary diversion and protective works to divert streamflow and other surface water through or around construction site and away from work while construction is in progress. Unless otherwise specified, a diversion must discharge into the same natural drainageway in which its head waters are located.

F. Sediment Barriers: Construct and maintain one or more sediment barriers to receive runoff leaving site. For drainage areas up to 2 acres, provide silt fence barriers, erosion bale barriers, or temporary diversions. For drainage areas between 2 and 5 acres, provide sediment traps. For drainage areas between 5 and 150 acres, provide sediment basins.

G. Storm Drain Protection: Protect storm drain inlets by using inlet protection of the type shown on Drawings. If not shown, use inlet protection fabric, silt fence barriers, erosion bale barriers, or equivalent.

H. Tracking Pads: Prevent tracking of soils and sediments onto public and private streets by constructing temporary graveled access roads and parking areas as needed at the construction site. Remove at the end of each work day soils and sediment reaching public and private streets not part of the construction site.

I. Re-establishment of Vegetation: Re-establish temporary or permanent vegetation on disturbed areas within the time limits allowed by applicable standards.

J. Sediment Deposits: Remove and dispose of sediment deposits when deposits reach one-half the volume capacity of sediment barrier, unless otherwise indicated.

3.02 EROSION CONTROL MONITORING AND REPORTING

A. Contractor shall conduct the following inspections:

1. Weekly inspections of implemented erosion and sediment controls.
2. Inspections of erosion and sediment controls within 24 hours after a precipitation event that produces 0.5 in. of rain or more during a 24 hour period.

B. Contractor shall prepare weekly written reports of all inspections that include:

1. Date, time, and exact place of inspection.
2. Name of individual who performed inspection.
3. An assessment of condition of erosion and sediment controls.
4. A description of any erosion and sediment control implementation and maintenance performed.
5. A description of the present phase of construction at site.

3.03 DUST CONTROL

A. Minimize dispersion of dust from construction operations by application of water or other dust control materials. Controls shall confine dust and dirt within the immediate area of project. Masonry and debris shall be thoroughly soaked during demolition and loading operations.

3.04 NOISE CONTROL

A. Provide noise control measures to limit the amount of noise and prevent nuisance. Properly equip all equipment with mufflers. Limit construction activities generating significant noise to normal working hours.

3.05 HAZARDOUS ENVIRONMENTAL CONDITIONS

A. If underground petroleum storage tanks, petroleum contaminated soils, or other hazardous environmental conditions are encountered, and are not identified to be part of the work, Contractor shall immediately stop all work in connection with the hazardous condition and shall notify Owner and A/E. (See the General Conditions of the Contract for specific procedures that may apply.)

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Provide cast-in-place concrete work as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

1.02 SUBMITTALS

A. Mix Designs: Submit proposed mix designs to A/E ten days prior to beginning concrete work. Do not begin concrete production until mixes have been reviewed.

B. Delivery Tickets: Submit delivery tickets to A/E for each load of concrete delivered to project.

C. Test Reports: Submit copy of field and laboratory test results to A/E.

D. Make submittals in accordance with Section 01 01 00 .

1.03 QUALITY ASSURANCE

A. Prior to placing concrete, request review of reinforcement steel by A/E.

1.05 TESTING

A. A/E may perform tests to verify that concrete slump, air content, temperature, and strength meet specified requirements. However, these tests are not intended to provide Contractor with information he may need to assure that materials and workmanship meet requirements of specifications, and their performance will not relieve Contractor of responsibility of performing his own tests for that purpose.

PART 2 PRODUCTS

2.01 CEMENT

A. Portland cement, ASTM C150, Type I.

2.02 AGGREGATES

A. Fine and coarse aggregates, ASTM C33, consisting of clean, hard, durable sand and crushed rock, crushed gravel, or gravel. Coarse aggregate shall meet grading requirements for size number 67, 57 or 467. Maximum coarse aggregate size shall not be more than one-fourth of slab thickness. Ratio of coarse aggregate to fine aggregate shall not be less than 1:1 nor more than 2:1.

2.03 WATER

A. Mixing water shall be potable, free of oil, acid, excessive alkalinity, organic matter, and salts.

2.04 ADMIXTURES

A. Air-entraining admixture shall conform to ASTM C260. Other admixtures which do not adversely affect strength and durability of concrete may be used with permission of A/E, if used in strict accordance with manufacturer's instructions. Care shall be exercised to assure

that the admixture does not increase or decrease air content outside of allowable limits. Do not use salt or chemical anti-freeze admixtures.

2.05 REINFORCING STEEL

A. ASTM A615, Grade 60, new billet steel bars. Provide metal chairs, stirrups, spacers, and hangers to support reinforcement and insure against displacement during placement of concrete.

2.06 WELDED WIRE FABRIC

A. ASTM A185, welded steel wire fabric.

2.07 EXPANSION JOINT FILLER

A. Premolded joint filler, ASTM D1751, asphalt-saturated cellulosic fiber; 1/2 in. thickness by depth of concrete, unless otherwise shown.

2.08 CURING COMPOUND

A. Liquid membrane-forming compound, ASTM C309, Type 2, white-pigmented.

2.09 CONCRETE MIXTURES

A. Conform to minimum standards for class and usage in Part 4 Schedules. Use Class AA if not otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Wet forms with form release agent.

B. Sprinkle subgrade with water.

C. Separate old concrete and adjacent structures from new pour with expansion joint filler.

D. Position reinforcement steel to provide min. 1-1/2 in. concrete cover.

3.02 JOINTS

A. Expansion joints shall consist of expansion joint filler placed to full depth of concrete. Contraction joints shall consist of a slot or groove, at least 1 in. in depth and 1/4 in. wide formed in a manner approved by A/E.

3.03 MIXING CONCRETE

A. "Ready-mix" concrete shall be produced, delivered and handled in accordance with ASTM C94. Concrete shall be deposited at job site within one hour after introduction of water in mix. Care shall be taken in transferring concrete from truck or mixer to avoid segregation of aggregates in mixture.

3.04 PLACING CONCRETE

A. Deposit concrete in a manner requiring as little rehandling as possible. Necessary hand spreading shall be done with shovels; do not use rakes. Workers shall rinse dirt from boots before walking in green concrete.

B. Placing shall be continuous between transverse joints without intermediate bulkheads. In case of temporary shutdown, concrete at unfinished end of slabs shall be covered with wet burlap. When delays are unavoidable and of such length that concrete will attain initial set, and in any event where an interruption in concrete placing operations of more than 30 minutes occurs, a joint shall be installed.

C. Batches shall be dumped so concrete will not displace joint installations. Concrete shall be shoveled into place against expansion joints and against or around other preassembled installations which might otherwise be displaced by concrete flowing against them. Place concrete against both sides of intermediate joint installations simultaneously.

D. Provide sufficient spading, rodding, and mechanical vibrating to insure concrete flow into corners and places where concrete will not readily flow. Water-tightness and absence of honeycomb is required for acceptance.

E. Rock pockets or voids found after forms are removed shall be filled immediately with a well-mixed grout composed of one part of Portland cement and three parts of fine aggregate finished to true surface of concrete.

F. Concrete shall not be placed around castings, frames, joints, and other embedded items until they have been accurately adjusted and set to required alignment and grade. Prior to placing of concrete, castings, frames, and embedded metal fixtures shall be painted on their contact surface with a heavy coat of asphaltic mastic or separated with expansion joint filler.

3.05 COLD WEATHER PLACING

A. Protect concrete work from physical damage or reduced strength caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as specified below.

1. When air temperature falls to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less that 60 deg F (50 deg F for heavy sections) and not more than 90 deg F at point of delivery.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.
3. During seasons when atmospheric temperature may be expected to drop below 40 deg F, concrete shall be protected by covering with impermeable paper and not less than 12 in. of loose dry hay or straw. Retain covering for ten days.

3.06 HOT WEATHER PLACING

A. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as specified below.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated in total amount of mixing water.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
3. Spray forms, reinforcing steel, and subgrade just before concrete is placed.
4. Do not use set-control admixtures, unless approved by A/E.

3.07 FINISHING

A. Thoroughly float surface after concrete has been struck off.

B. Walks, ramps, pavements, curb and gutter, and driveways shall have a lightly broomed surface with grain perpendicular to direction of travel.

C. Edges shall be neatly trimmed with 1/4 in. radius edging tool. Honeycombed areas shall be pointed with mortar.

3.08 CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Cure formed and unformed concrete for seven days or until 75 percent of the required 28-day compressive strength is obtained, whichever is less. Methods may include plastic sheets, constant wetting of surface with water, curing paper, or commercial curing compound. Apply curing compound at not less than 200 sq ft per gal in accordance with manufacturer's recommendations.

PART 4 SCHEDULES

4.01 CLASSES OF CONCRETE

Class	Min. Comp. Strength, psi	Slump, In.	Min. Cement, Bags/ Cu Yd	*Max. Water, Gal/ Cu Yd	Air Content, % By Volume	Use
AAA	3000 (3-day)	1-3	7.0	33	5-8	High early strength
AA	4000** (28-day)	1-3	6.0	30	5-8	Pavements, curbs, walks, walls, foundations, slabs
CC	3000 (28-day)	1-4	5.5	32	3-5	Manhole bases, envelopes, cradles, blocking, pipe anchors

* Including aggregate moisture
** Flexural strength shall be minimum 650 psi at 28 days, ASTM C78.

END OF SECTION

SECTION 31 05 10

SITE PREPARATION

PART 1 GENERAL

1.01 SUMMARY

A. Provide site preparation as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

B. Work includes, but is not limited to:

1. Protection of improvements, plants, and utilities.
2. Removal and replacement of improvements.
3. Location of utilities and coordination with utility companies.
4. Clearing and grubbing trees and vegetation.
5. Topsoil salvage.
6. Miscellaneous demolition and salvage.

1.02 MEASUREMENT AND PAYMENT

A. Site preparation will be considered incidental to the work except where separate pay items are included in Bid Schedule.

B. Drawing notes related to removals and replacements shall be interpreted as directives to Contractor for such work at no extra cost except where separate pay items are provided in Bid Schedule.

PART 2 (NOT USED)

PART 3 EXECUTION

3.01 PROTECTION

A. Protect improvements on site and on adjoining properties. Provide barricades, coverings, or other types of protection as necessary to prevent damage and to safeguard against injury. Restore to original condition improvements damaged by the work or improvements which required temporary removal during construction.

B. Protect existing vegetation indicated to remain against unnecessary cutting, breaking, bruising, or smothering by stockpiling excavated materials or parking of vehicles within drip line. Provide temporary fences, tree wells, barricades, or guards; repair or replace trees and vegetation damaged by construction operations.

C. Maintain survey monuments, reference points, and benchmarks; notify Owner of disturbance to markers.

D. No extra payment or time will be allowed for protection work that could have been suspected or anticipated by site inspection and interpretation of bidding documents prior to execution of contract.

3.02 LOCATING EXISTING UTILITIES

A. Location and description of underground utilities and structures shown on drawings are approximate and are based on records available to Owner or surface features indicating their existence. There may be other utilities within project area that are not shown.

B. Notify all affected utility companies of construction operations at least three working days before beginning work near their facilities. Do not begin excavation work until underground utility locations have been marked.

C. Use caution when excavating so that exact location of underground utilities, both known and unknown, may be determined. Provide adequate protection and support for utilities during construction operations.

D. If uncharted or incorrectly charted utilities are encountered during excavation work, or if proposed construction conflicts with existing utilities, give prompt notice and submit proposed solution to A/E for approval. If required, make arrangements with utility companies for relocation of interfering utilities. No extra cost or time will be allowed for unexpected delays or coordination work, except for authorized alterations as follows. When a change is permitted to avoid a utility relocation, A/E will determine whether such change constitutes extra work. Underground utilities and structures located outside of construction limits which Contractor wishes to have moved to facilitate construction shall be arranged with each owner of such facilities; Contractor shall pay all costs of such relocations for convenience.

E. During construction of pipe lines, it may be necessary to cross under certain underground utilities and structures. Prevent damage to such facilities. Where necessary, divert flow in drains or culverts so that trenches are kept dry during work. Deposit and compact sand or gravel bedding and backfill around exposed facilities by mechanical means in layers not to exceed 6 in. Wherever such facilities are disturbed or broken, restore them to good condition at no additional cost to Owner.

3.03 SITE CLEARING

A. Remove trees, stumps, snags, shrubs, brush, heavy growths of grass, weeds and other vegetation, improvements, rubbish and debris, and obstructions that interfere with proposed construction; remove items only as necessary for completion of work.

B. Cut brush and vegetation flush with ground. Grub out stumps, roots having a diameter of 2 in. or larger, and root clusters to a depth of at least 2 ft below subgrade elevation for pavements, structures, and embankments and 6 in. below ground surface in other areas.

C. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Cut back roots a minimum of 1 ft from concrete work, paving, and structures and to a depth of not less than 2 ft below structures, foundations, and embankments.

3.04 TOPSOIL STRIPPING

A. Topsoil shall include all friable, fertile, loam soil suitable for grass and plants, found at surface to a depth of approximately 4 in., reasonably free of subsoil, clay lumps, stones, objects over 2-in. diameter, weeds, large roots, root clusters, and other objectionable material.

B. Strip topsoil from project area to whatever depths encountered; prevent intermingling with underlaying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping topsoil.

C. Where trees are indicated to remain, terminate stripping a sufficient distance from such trees to prevent damage to root system.

D. Stockpile topsoil in storage piles in areas where designated. Construct storage piles to freely drain surface water. Cover or sprinkle water on storage piles to prevent windblown dust.

3.05 DEMOLITION

A. Remove structures, pavements, and improvements within construction limits as shown and as required for construction. Saw cut asphaltic and concrete pavement to provide a smooth straight joint. Remove below-grade items encountered, such as slabs and foundations, that interfere with construction.

B. Owner shall have first right to retain all useful salvage. All items not retained by Owner and construction debris shall become property of Contractor.

3.06 DEBRIS DISPOSAL

A. Remove debris and excess materials from site and legally dispose of it; do not burn debris.

END OF SECTION

SECTION 31 05 15

CONSTRUCTION DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Provide construction dewatering as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

B. Work under this Section shall consist of removal of surface water and ground water as necessary to perform required work, including:

1. Building and maintaining temporary impounding works, channels, and diversions.
2. Furnishing, installing, and operating pumps, piping, and other facilities and equipment.
3. Removing temporary works and equipment when no longer required.

C. Contractor shall be responsible for:

1. Protection of work area and safely passing stream flow for duration of construction.
2. Means and methods for dewatering work areas, including the actual dimensions, configurations, stability, and dewatering capacity of cofferdams and protective works.

D. Contractor shall repair, at its expense, any damage to foundations, structures, or other improvements caused by failure of any part of cofferdams or protective works.

1.02 SUBMITTALS

A. Dewatering Plan: Submit a written plan and drawings of proposed method for dewatering and diversion of water. Submittal shall include methods of construction and other details left open to Contractor's choice, or not fully shown on Contract Drawings. Cofferdams, diversions, or other temporary structures submitted by Contractor shall be designed and sealed by a registered professional engineer.

B. Written plan, drawings, and permit application shall be submitted to A/E and WDNR at least 30 days prior to start of construction of cofferdams or deep excavations. Note that cofferdam permit may take 90 days to obtain in some instances.

C. Type and clearance of dewatering and diversion of water, insofar as such details affect character of finished work will be subject to approval of A/E, but other details of design will be left to Contractor who shall be responsible for successful construction of work. Acceptance of dewatering plan by A/E will not relieve Contractor of responsibility for completing specified work.

D. The final dewatering plan needs to be submitted to the WDNR

Michelle Schneider, PE
Water Management Engineer
Wisconsin Department of Natural Resources
141 NW Barstow Street, Room 180
Waukesha, WI 53188

1.03 PERMITS

A. Rehabilitation of the dam, including cutting and filling in water course for cofferdams and diversions, shall be in accordance with Wisconsin Department of Natural Resources (WDNR), U.S. Army Corps of Engineers (COE), and Federal Energy Regulatory Commission (FERC) permits issued for project.

B. Owner has applied for permits to rehabilitate dam from WDNR, COE, and FERC and the work is subject to their inspection, review, and approval. Refer to Appendix 'X' (*insert prior to bidding*).

C. Contractor shall obtain and pay for a Chapter 30 WDNR/COE cofferdam permit based upon its proposed plan and drawings for dewatering and diversion of river flows (if used). Additionally, the contractor shall follow provisions listed in the Chapter 31 permit.

D. Should Contractor's actions or construction not be in compliance with applicable permits, Contractor shall remedy situation as directed by Owner, and all costs associated with those actions shall be borne by Contractor.

1.04 SITE CONDITIONS

A. Information on flood flows at the dam and discharge capacity is presented in Appendix 'X' (*insert prior to bidding*).

PART 2 PRODUCTS

2.01 MATERIALS

A. Contractor shall furnish all materials for and shall construct and maintain, as it deems necessary, all cofferdams, channels, drains, sumps, and protective works for protection of work areas.

B. Contractor, at its option, may select whatever materials are available at project site for use in cofferdam, subject to permit requirements.

PART 3 EXECUTION

3.01 DIVERTING SURFACE WATER

A. Construct, maintain, and operate cofferdams, channels, flumes, sumps, and other temporary diversion and protective works to divert streamflow and other surface water through or around construction site and away from work while construction is in progress. Unless otherwise specified, diversions must discharge into the same natural drainageway in which its headwaters are located.

B. Surface water diversion procedures shall not create a condition where erosion or deposition of materials occurs in stream. Riprap or other means of protection shall be provided for erosion protection adjacent to all cofferdams where flows could occur.

C. Diversion works which are moved out of position by any cause during installation shall be righted or enlarged so as to provide necessary clearance.

D. As work area is dewatered, diversion works that are not watertight shall be plugged or sealed as much as practical to reduce infiltration of water into work area.

E. No shoring will be permitted in diversion works which will induce stress, shock, or vibration in permanent structure.

3.02 DEWATERING EXCAVATIONS AND WORK AREAS

A. Foundations, cutoff trenches, and other parts of construction site shall be dewatered and kept free of standing water or excessively muddy conditions for proper execution of construction work. Furnish, install, operate, and maintain wells, drains, sumps, pumps, and other equipment needed to perform dewatering as specified. Dewatering methods that cause loss of fines from foundation materials will not be permitted.

B. Maintain pumping operations to keep work area dry until all materials, equipment, and debris have been removed and diversion works is to be removed.

3.03 DEWATERING BORROW AREAS

A. Maintain borrow areas in drainable condition or otherwise provide for timely and effective removal of surface waters that accumulate, for any reason, within borrow areas.

3.04 REMOVAL OF TEMPORARY WORKS

A. Remove temporary works when no longer required; level and grade earth as required to restore appearance and to prevent obstruction to flow or any other interference with operation of or access to permanent works.

B. Unless otherwise noted, pipes and casings shall be removed from temporary wells and wells shall be filled to adjacent ground level with gravel or other approved material.

C. Construction dewatering material shall be removed from site and properly disposed of.

D. Contractor shall make its own arrangements for a disposal site and shall pay all costs involved.

END OF SECTION

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. Provide trenching and backfilling for piping, conduits, and other buried utilities as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

1.02 RELATED SECTIONS

31 05 10 Site Preparation.

1.03 MEASUREMENT AND PAYMENT

A. Trenching, backfilling, and compacting work specified under this Section, including removing and disposing of obstructions, repairing or replacing damaged items, dewatering, and related construction delays, shall be considered incidental to bid items; no additional compensation will be allowed unless a separate pay item is included in Bid Schedule or otherwise provided below.

B. When a pay item for Rock Excavation is included in Bid Schedule, payment will be made at contract unit price per cubic yard. Measurement for payment will be the volume of rock excavation, calculated on the basis of average cross-sectional end areas, within the maximum trench width for rock excavation as defined in "Trenching" article. Unit price shall include furnishing and placing granular bedding between rock and pipe. If rock excavation is not included in Bid Schedule, a price will be negotiated as provided in General Conditions, unless otherwise indicated.

C. When a pay item for Sheathing and Bracing is included in Bid Schedule, payment will be at contract price per linear foot of sheathed trench, including removal. Sheathing ordered left in place will be paid for on same basis, plus invoice cost of lumber including upper removed portion. Spot braces, individual shorings spaced at various intervals along trench, portable trench boxes or sliding shields will be considered incidental to cost of pipe laying.

D. When a pay item for Well Point Dewatering is included in Bid Schedule, payment will be made at contract unit price per linear foot of effectively dewatered trench up to actual length of header used. Header will be measured parallel with pipeline from first well point to last well point. (Points shall be uniformly spaced.) No extra payment will be made for well pointing around structures or for laterals. Any single well point system installation will be paid for only once regardless of whether system will dewater one trench or two, such as where two pipelines are installed in separate trenches paralleling each other. Payment for individual dewatering wells will be per linear foot of trench effectively dewatered, based on the contract unit price for well pointing, unless otherwise authorized.

E. When a pay item for Deep Well Dewatering is included in Bid Schedule, payment will be at the contract unit price per linear foot of effectively dewatered trench up to actual length, measured parallel with pipeline, from first well to last well. No extra payment will be made for wells around structures or for laterals. Any single well system installation will be paid for only once regardless of whether system will dewater one trench or two, such as where two pipelines are installed in separate trenches paralleling each other. Payment for individual dewatering wells will be the linear foot of trench effectively dewatered, based on the contract unit price for deep wells, unless otherwise authorized.

F. When a pay item for Washed or Crushed Stone is included in Bid Schedule, payment shall include extra excavation and replaced stone and granular bedding. Payment will be on basis

of trench measure at contract unit price per cubic yard. Width of trench measure shall not exceed limits defined in "Trenching" article.

G. When a pay item for Granular Base is included in Bid Schedule, payment will be made on basis of contract unit price per cubic yard of compacted volume determined by measurement of excavated trench space. Such payment shall include extra excavation, as required.

H. When a pay item for Granular Backfill is included in Bid Schedule, payment shall include excavation and disposal of undesirable material and providing and placement of granular backfill. Payment quantity shall be per cubic yard based on computing height and width of trench excluding pipe area. Height shall be from top of bedding to finished surface, excluding topsoil or pavement. Width shall be actual trench width, but shall not exceed trench sloping limitations established by Wis. Adm. Code. Granular Bedding required in hard clay shall be included in quantity of Granular Backfill.

I. When a pay item for Trench Compaction is included in Bid Schedule, payment will be made at contract unit price per linear foot of compacted trench measured along pipeline.

1.04 CLASSIFICATION

A. Excavation of materials encountered under this work will be unclassified, except for excavation of rock as defined below.

B. Rock is defined to include hard, solid rock in ledges, bedded deposits, boulders, buried concrete masses not shown on drawings, and natural conglomerated deposits so firmly cemented as to possess all characteristics of solid rock. Isolated masses less than 1 cu. yd. will not be considered as rock.

C. Firmly cemented sedimentary materials in the form of silt-stone, sandstone, shale, or conglomerate will be classified as rock if, after several blows with pointed end of a standard pick axe applied to flat surface, material cannot be loosened, broken down, or penetrated.

D. When material is encountered that may be classified as rock, notify A/E who will test degree of resistance and make a final determination.

1.05 SUBMITTALS

A. Samples: Two weeks prior to start of construction, indicate source and submit samples of proposed soil materials for testing and review. Make submittals in accordance with Section 01 01 00 / 01 33 00.

1.06 TESTING

A. A/E may perform tests to verify that soils and completed work meet specified requirements. However, these tests are not intended to provide Contractor with information he may need to assure that materials and workmanship meet requirements of specifications, and their performance will not relieve Contractor of responsibility of performing his own tests for that purpose. Where subgrade, base, bedding, or backfill materials do not conform to type or density specified, soil shall be replaced or reworked to conform. Cost of extra tests for replaced or reworked areas shall be paid for by Contractor.

1.07 PROTECTION

A. Protect existing improvements, utilities, trees and shrubs, and reference marks in accordance with Section 31 05 10.

1.08 BLASTING

A. Use of explosives is not permitted.

PART 2 PRODUCTS

2.01 SOIL MATERIALS, GENERAL

A. Soil for fill and backfill shall be free of organic matter, debris, frozen soils, ice, and other objectionable materials. Rock particles larger than maximum size specified shall be removed prior to placement of soil.

B. Select existing material excavated from site may be used if it meets requirements specified. If necessary, furnish additional approved material from suitable off-site sources.

2.02 WASHED OR CRUSHED STONE

A. Clean, hard, tough, durable, 1-1/2 in. washed stone, crushed rock, crushed gravel, or gravel free from adherent coatings and soft, flat, or elongated particles.

2.03 GRANULAR BASE, BEDDING, AND BACKFILL

A. Select soils complying with ASTM D2487 soil classification groups GW (well-graded gravel), GP (poorly-graded gravel), SW (well-graded sand), or SP (poorly-graded sand). Aggregate shall pass a 3/4-in. sieve and not more than 35% shall be retained on a No. 10 sieve. Maximum 5% by weight shall pass a No. 200 sieve.

2.04 STRUCTURAL BACKFILL

A. Select soils complying with ASTM D2487 soil classification groups GW, GP, SW, or SP; or these groups in combination with groups GM, GC, SM, or SC (dual symbol soils). Aggregate shall pass a 1-1/2 in. sieve and not more than 35% shall be retained on a No. 10 sieve. Maximum 12% by weight shall pass a No. 200 sieve; plasticity index shall not exceed 5.

2.05 BACKFILL

A. Previously excavated soils, free of aggregate larger than 3 in., and suitable for intended purpose.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide site preparation, including clearing and topsoil removal, as required in accordance with Section 31 05 10.

3.02 TRENCHING

A. Excavate trenches so that pipe can be laid safely and accurately to required line and grade. Hand excavate for bells, fittings and projections to allow for proper jointing and to insure that pipe rests evenly along barrel and is not resting on bell.

B. Excavation shall extend to bottom of pipe bedding. Unnecessary excavation below this required level shall be filled with compacted sand, gravel, crushed stone or concrete, as approved by A/E.

C. In sand and gravel soils, bottom of trench may be shaped to fit bottom 1/3 of pipe. In silt or clay soils, bottom of trench shall be 4 in. below pipe barrel and 3 in. below bell. In rock, bottom of trench shall be 6 in. below pipe barrel. Under foundations and footings, bottom of trench shall be 8 in. below pipe. Provide Granular Bedding as specified below.

D. Trench widths in ordinary soil shall be limited at top of pipe to not less than a 6 in. clearance on either side of barrel to allow for installation of bedding material between pipe and trench

wall. Maximum trench width at top of pipe shall be outside pipe diameter plus 24 in. (30 in. minimum). Trench above top of pipe may be sloped, stepped or vertical to comply with state and federal regulations regarding trenches.

E. Minimum trench width in rock shall not be less than that for ordinary soil. Maximum trench width shall be outside pipe diameter plus 18 in. for an unsheathed trench, and outside pipe diameter plus 24 in. for sheathed trench.

3.03 STABILITY OF TRENCHES

A. Slope sides of trenches to angle of repose of material excavated; otherwise, provide sheathing and bracing where sloping is not possible either because of space restrictions or stability of material excavated. Comply with applicable codes and ordinances.

B. Maintain sides and slopes of trenches in a safe condition until completion of backfilling. Take precautions to prevent slides or cave-ins when trenches are made in locations adjacent to backfilled trenches, and when sides of trenches are subjected to vibrations from traffic, machinery, or any other source.

3.04 SHEATHING AND BRACING

A. Provide tight sheathing where necessary to protect nearby structures and pavements, or when trench size must be confined. Notify A/E of unforeseen condition that requires use of sheathing. Sheathing shall be driven unless soil conditions allow sets to be placed after excavating. If placed after excavating, voids between trench wall and sheathing shall be immediately filled with sand.

B. Removal of sheathing shall not take place until trench is backfilled. Compact backfill by flooding or jetting after sheathing is removed. Obtain written approval to leave some or all of sheathed sets to remain in place; cut off and remove upper portion within 2 ft of surface.

3.05 LIMITS OF AMOUNT OF WORK OPENED

A. Do not open trenches more than 75 ft in advance of pipe laying unless otherwise permitted by A/E. Backfilling shall occur immediately after the completed pipe laying. Provide construction fence barricades around open trenches and pits when unattended.

B. Trenches adjacent to roadways in service shall be backfilled to existing grade at completion of each day's work. Trenches elsewhere shall be backfilled each evening to within 50 ft of complete pipe installation.

C. Maintain access to commercial enterprises at all times. Intersecting streets, private drives, and alleys shall be open to traffic at end of each day, unless otherwise approved.

3.06 WET TRENCH CONDITIONS

A. Contractor shall attempt to dispose of ground water or surface drainage entering trench by employing ordinary dewatering techniques such as use of sump pumps, sump pits adjacent to pipe alignment, dikes, and similar methods. Dispose of or divert water along existing drainage ways. Do not place water so that it ponds on roadway subgrade or adjacent private property.

B. Allowing water to flow into pipe being laid will not be permitted, except for storm sewer after joints have set. Install temporary stopper or plug on upper end of pipe if there is danger of sand or debris being washed into pipe.

3.07 WELL POINT AND DEEP WELL DEWATERING

A. Where in opinion of A/E, trench cannot be kept dry by ordinary dewatering techniques, install a well point or deep well system to effectively dewater trench.

B. If dewatering wells are approved, they shall be drilled, maintained, and abandoned in accordance with requirements of Wis. Dept. of Natural Resources (WDNR). For dewatering wells that have a single or aggregate capacity greater than 70 gpm, obtain a well permit from WDNR, Private Water Supply Section, Box 7921, Madison, WI 53707. If dewatering wells are to be constructed on a property that is listed on WDNR's GIS Registry of Closed Remediation Sites, well driller shall complete and submit WDNR Form 3300-254 to obtain well approval.

3.08 UNSTABLE TRENCH BOTTOM

A. When trench bottom is unstable because of ground water, A/E may require extra excavation to remove unstable material. Provide Washed or Crushed Stone foundation followed by Granular Bedding as required in "Bedding and Initial Backfill" article.

3.09 POOR SUBSOIL MATERIALS

A. Notify A/E whenever muck, sawdust, bark, or other material is encountered which would not form a suitable and permanent base; A/E may order it removed and replaced with Granular Base up to bottom of normal trench section.

3.10 BEDDING AND INITIAL BACKFILL

A. Bedding, haunching, and initial backfill for rigid pipes shall be in accordance with ASTM C12, Class C or better. Bedding, haunching, and initial backfill for flexible pipes shall be in accordance with ASTM D2321, Class II or better.

B. Trenches dug in sandy or gravelly materials may use undisturbed earth for bedding provided surface is shaped to conform to pipe. Provide Granular Bedding in all other trenches from subgrade to a point supporting bottom 1/3 of pipe for rigid pipe and to springline (mid-height) for flexible pipe; see Details. Place and compact bedding so that it fills and supports pipe haunch area.

C. Immediately after installation of pipe, provide tamped Granular Backfill up to a minimum depth of 1 ft above pipe. Take special care in placing and tamping initial backfill material so alignment and grade of pipe is not disturbed nor pipe damaged.

3.11 TRENCH BACKFILL

A. Backfill more than 1 ft over pipe under roadways and walks shall be Structural Backfill. All other trench backfill over initial backfill zone may be previously excavated soil subject to approval by A/E.

B. Backfilling above initial backfill zone in areas where settlement is not critical may be done from top of trench by mechanical means. In no case shall backfill material be dropped from such a height or in such a volume that its impact will cause dislocation or damage to piping.

C. When backfilling in freezing temperatures, cover pipe and tamp backfill around pipe using only loose thawed material. Do not place frozen material in trench within 2 ft of top of pipe, nor around manholes and other structures.

3.12A COMPACTION

A. Provide compaction equipment required to obtain specified compaction. Compaction shall be by mechanical means, except bedding and initial backfill may be hand or mechanically tamped. Compact each layer of soil material to not less than the density specified in Part 4 Schedules.

3.12B COMPACTION

A. Provide equipment required to obtain specified compaction. Compaction shall be by mechanical means, except bedding and initial backfill may be hand or mechanically tamped. Compaction shall be Class I under pavements, roadways and walks, and Class II in all other areas. Trench jetting, as described below, may be used for compaction in areas not under roadways and walks if specifically approved.

B. Class I Trench Compaction shall consist of mechanically compacted backfill placed in 9-in. layers, from 1 ft above pipe to surface, each compacted to 95% of maximum density as determined by ASTM D698/AASHTO T99 (Standard Proctor test).

C. Class II Trench Compaction shall consist of mechanically compacted backfill placed in 18-in. layers, each compacted to 90% of maximum density as determined by ASTM D698/AASHTO T99 (Standard Proctor test).

D. Trench jetting shall consist of jetting in max. 10-ft lifts, using a 1-1/2 in. diameter hose to carry water from available hydrants and 4 ft minimum length by 1-1/2 in. diameter steel pipe attached to end of hose inserted into backfilled trench. Pipe shall be inserted at intervals of 6 ft or less along trench and maintained until trench is saturated. Hose shall be equipped with a throttling valve to allow hydrant valve to remain fully opened. Depression caused by settlement shall be promptly backfilled. Contractor shall arrange and pay for water.

3.13 RESTORATION

A. Unless otherwise specified, restore surface drainage, pavements, lawns, and other areas disturbed by construction to their original conditions. Areas adjacent to roadway shall be sloped to drain.

3.14 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. If directed by Owner, deliver excess excavated materials to designated areas within one mile of point of loading. Dispose of excess excavated materials not wanted by Owner and waste materials at legal disposal site.

PART 4 SCHEDULES

4.01 COMPACTION SCHEDULE

Material Type	Usage	Lift Thickness	Compaction[1]
Washed or Crushed Stone	Unstable trench bottom	6"	90%
Granular Base	Over excavation	6"	90%
Granular Bedding	Bedding and haunching	6"	85%
Granular Backfill	Initial backfill	6"	85%
Structural Backfill	Trench backfill under roadways and walks	9"	95%
Backfill	Trench backfill not under roadways and walks	12"-24"	90%

[1] Percent of maximum density determined in accordance with ASTM D698 or AASHTO T99 (Standard Proctor Test)

END OF SECTION

SECTION 31 37 00

RIPRAP

PART 1 GENERAL

1.01 SUMMARY

A. Provide loose rock riprap, including aggregate bedding and geotextile filter fabric, as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

1.02 MEASUREMENT AND PAYMENT

A. Riprap, including (when specified) aggregate bedding and geotextile filter fabric, will be paid for as part of the contract unit price each for APRON ENDWALL AND RIPRAP.

1.03 SUBMITTALS

A. Product Data:

1. Submit information on sources of riprap. Provide access to sources to enable A/E to inspect and obtain samples. Do not deliver riprap until reviewed by A/E.
2. Submit fabric product data. Include material samples, certification of physical properties, and installation procedures.

B. Test Results: Submit grain size analysis of bedding material.

C. Make submittals in accordance with Section 01 01 00 / 01 33 00.

1.04 TESTING

A. A/E may perform tests to verify that riprap and completed work meet specified requirements. However, these tests are not intended to provide Contractor with information it may need to assure that materials and workmanship meet requirements of specifications, and their performance will not relieve Contractor of responsibility of performing its own tests for that purpose.

1.05 DELIVERY, STORING, AND HANDLING

A. Store and handle fabric in accordance with manufacturer's instructions.

B. Store and handle bedding aggregates by methods that prevent segregation of particle sizes or contamination by mixing with other materials.

PART 2 PRODUCTS

2.01 MATERIAL SOURCE

A. Obtain rock for loose rock riprap from designated source. Material shall be excavated, selected and handled as necessary to conform to designated quality and grading requirements.

B. Contractor shall notify A/E in writing if it intends to obtain materials from another source; provide free access to the alternate source for purpose of obtaining samples for testing.

2.02 RIPRAP

A. Durable field or quarry stone that is sound, hard, dense, resistant to the action of air and water, and free of seams, cracks, or other structural defects. Use stone pieces with a length and width no more than twice the thickness.

B. Riprap gradation shall be as follows, where average dimension of stone pieces is determined by averaging measurements of thickness, width, and length.

Average Dimension Range (Inches)	Fraction of Gross In-Place Riprap Volume Occupied By Stones
>16	0%
11 - 13	10% - 14%
9 - 11	15% - 21%
4 - 9	20% - 28%
<4	5% - 7%
<1	2% or less

2.03 BEDDING

A. Clean, hard gravel or crushed stone, free of organic matter and clay balls, well graded from 2 in. to No. 4 sieve size with less than 10% passing No. 4 sieve.

2.04 GEOTEXTILE FILTER FABRIC

A. Fabric shall be a woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride material whose function is to pass ground water from beneath fabric while restricting migration of subgrade soil particles into overlying stone ballast. Fabric shall be treated to insure stability under ultraviolet radiation (sunlight).

B. Provide fabric with the following performance and in-service properties (properties shall be in both principal fabric directions where applicable):

Property	Value	Test
Grab Tensile Strength	205 lb (min.)	ASTM D4632
Puncture Strength	80 lb (min.)	ASTM D4833
Apparent Breaking Elongation	20% (min.)	ASTM D4632
Apparent Opening Size	30 sieve (max.)	ASTM D4751
Permittivity	0.12 sec^{-1} (min.)	ASTM D4491

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. Grade subgrade surfaces to lines and grades as shown with an allowance for riprap and bedding (where indicated). Remove organic materials. Compact soft subgrade soils. When fill to achieve subgrade lines is required, provide granular materials.

B. Materials shall not be placed until foundation preparation is completed and subgrade surfaces have been approved.

3.02 FABRIC INSTALLATION

A. Provide fabric under all riprap, unless otherwise shown. Install fabric as shown and in accordance with manufacturer's recommendations.

B. Surface to receive fabric shall be smooth and free of obstructions, depressions, and debris. Lay fabric parallel to direction of water flow.

C. If lapping of fabric is required, minimum overlap shall be 2 ft. Overlaps may be eliminated if fabric sections are either factory or field sewn. Seam strength shall be at least 80% of fabric tensile strength.

D. Secure fabric in place to prevent shifting before or during placement of stone or riprap.

E. Repair or replace torn or punctured fabric in accordance with manufacturer's instructions; no extra compensation will be allowed.

3.03 AGGREGATE BEDDING PLACEMENT

A. Where indicated, place aggregate bedding to receive riprap; spread material uniformly on prepared subgrade to depth specified. Unless otherwise noted, compaction of aggregate bedding and filter layers is not required but surface shall be finished reasonably free of mounds, dips and windrows.

3.04 EQUIPMENT-PLACED ROCK RIPRAP

A. Riprap shall be placed to full course thickness in one operation from base of slope upward; height of riprap freefall shall not exceed 1 ft. Riprap shall be reasonably homogeneous with larger rocks uniformly distributed and firmly in contact and smaller rocks and spalls rammed into voids between larger rocks to interlock and form an even surface.

B. Hand placement will be required where necessary to correct obvious irregularities and to prevent damage to adjacent improvements and wherever equipment placement methods are unsatisfactory.

3.05 HAND-PLACED RIPRAP

A. Riprap shall be securely bedded with larger rocks firmly in contact one to another. Spaces between larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on edge.

END OF SECTION

SECTION 32 17 20

PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SUMMARY

A. Provide pavement markings as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

1.02 MEASUREMENT AND PAYMENT

A. Pavement markings will be measured and paid for in accordance with WIDOT Std. Spec., Subsections 646.4 and 646.5.

1.03 SUBMITTALS

A. Product Data: Submit product data for review prior to beginning work.

B. Make submittals in accordance with Section 01 01 00 / 01 33 00.

PART 2 PRODUCTS

2.01 MARKING PAINT

A. Standard marking paint complying with the requirements of WIDOT Std. Spec., Subsection 646.2.2.

B. Color is Yellow. Marking is 4” Double Yellow Centerline.

2.02 GLASS BEADS

A. NOT USED

PART 3 EXECUTION

3.01 APPLICATION

A. Apply marking paint in accordance with the methods and rates of WIDOT Std. Spec., Subsection 646.3.

B. The proving period of WIDOT Std. Spec., Subsection 646.3.3.4 shall apply to this work.

3.02 REMOVING PAVEMENT MARKINGS

A. Where existing pavement marking are designated to be removed, comply with WIDOT Std. Spec., Subsection 646.3.4.

END OF SECTION

SECTION 32 19 10

PAVEMENT REPLACEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Replace pavements and appurtenant improvements disturbed by construction as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

B. Restore surfaces as near as practical to condition existing prior to construction and as designated. Clean site and remove equipment, salvaged material, unused materials, and debris resulting from construction. Repair or replace pavements and other items within and beyond construction limits damaged or destroyed through carelessness or failure to follow reasonable safeguards.

C. Unless otherwise indicated, locations and types of Pavement Replacement shall be in accordance with Part 4 Schedules.

1.02 RELATED SECTIONS

32 99 10 Turf Replacement.

1.03 MEASUREMENT AND PAYMENT

A. Replacement of pavements, curb and gutter, sidewalk, and driveways, and sawcutting joints will be considered incidental to bid items, unless included in Bid Schedule as separate pay items.

B. When Bid Schedule contains a unit price for (type) PAVEMENT REPLACEMENT, payment will be made at contract unit price per square yard within limits shown.

1.04 TESTING

A. A/E may sample and test replacement materials. Where materials do not conform to type or density specified, they shall be replaced or reworked to conform. Cost of extra tests for replaced or reworked areas shall be paid for by Contractor.

PART 2 PRODUCTS

2.01 GRANULAR SUBBASE COURSE

A. Granular material meeting the requirements of WIDOT Std. Spec., Section 350.

B. Use if needed for unsuitable soils.

2.02 BASE COURSE

A. Crushed stone or crushed gravel meeting the requirements of WIDOT Std. Spec., Section 305, for 1-1/4 in. base.

2.03 ASPHALTIC PAVEMENT

A. General: Hot-mixed asphaltic pavement consisting of 5 to 7 percent asphalt cement (by weight), aggregate, and mineral filler (as required) meeting requirements of WIDOT Std. Spec., Section 460, for Type E-1 pavement.

B. Asphalt Cement: Asphalt cement meeting the requirements of WIDOT Std. Spec., Section 455.2, Performance Grade PG 58-28.

C. Aggregate: Sound, angular crushed stone, crushed gravel, sand and other approved material meeting requirements of WIDOT Std. Spec., Subsection 460.2.2.

1. 4 ¼" Lower Layer(s) (Binder Course): 19 mm (3/4 in.) nominal size.
2. 1 ¾" Upper Layer (Surface Course): 12.5 mm (1/2 in.) nominal size.

D. Mineral Filler: Limestone dust, portland cement, or other inert filler material; ASTM D242 or AASHTO M17.

2.04 CONCRETE

A. Not Used.

PART 3 EXECUTION

3.01 PAVEMENT REPLACEMENT, GENERAL

A. Prepare for pavement replacement after excavations have been backfilled and compacted. Level and grade as necessary. Neatly sawcut adjacent permanent pavement. Restore and adjust to grade manhole castings, valve boxes, curb stops, and other utility appurtenances.

B. Designated types of pavement replacements shall be considered as minimums to be used for bidding purposes. Wherever existing pavement is heavier than the replacement indicated, contact A/E concerning the required replacement.

C. Comply with construction methods of WIDOT Std. Spec., unless otherwise indicated.

3.02 TYPE "A" PAVEMENT REPLACEMENT

A. Not Used.

3.03 TYPE "B" PAVEMENT REPLACEMENT (CTH E)

A. Provide 12 in. of granular subbase course (if needed for unsuitable soils), 12 in. of base course, and 4 ¼" of asphaltic binder course and 1 ¾" of asphaltic surface course. Compact subbase course and base course to 95% of Standard Proctor density (ASTM D698).

3.04 TYPE "C" PAVEMENT REPLACEMENT (CTH E SHOULDERS)

A. Provide 8 in. of base course compacted to 95% of Standard Proctor density (ASTM D698).

B. Place base course 2 in. below grade of existing asphaltic pavement to allow for asphaltic concrete paving by others. Provide additional base course where required to create transitions to existing pavement not removed under this work.

3.05 CURB AND GUTTER REPLACEMENT

A. Not Used.

3.06 SIDEWALK REPLACEMENT

A. Not Used.

3.07 DRIVEWAY REPLACEMENT

A. Not Used.

PART 4 SCHEDULES

4.01 PAVEMENT REPLACEMENT SCHEDULE

Location	Pavement Replacement
Asphaltic Pavements (CTH E)	Type B
Aggregate Surface (Shoulders)	Type C

END OF SECTION

SECTION 32 99 10

TURF REPLACEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Replace turf and appurtenant improvements disturbed by construction as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

B. Restore surfaces as near as practical to condition existing prior to construction and as designated. Clean site and remove equipment, salvaged material, unused materials, cleared brush and trees, and debris resulting from construction. Repair or replace turf, shrubs, trees, and other items within and beyond construction limits damaged or destroyed through carelessness or failure to follow reasonable safeguards.

C. Unless otherwise indicated, locations and types of Turf Replacement shall be in accordance with Part 4 Schedules.

1.02 RELATED SECTIONS

31 05 10 Site Preparation: For topsoil removal.
32 19 10 Pavement Replacement.

1.03 MEASUREMENT AND PAYMENT

A. Replacement of turf, fields, and similar improvements will be paid for at the contract lump sum price for TURF REPLACEMENT, unless separate pay items are included in Bid Schedule.

B. When Bid Schedule contains a unit price for (type) TURF REPLACEMENT, payment will be made at the contract unit price per square yard.

PART 2 PRODUCTS

2.01 IMPORTED TOPSOIL

A. Loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing surface soil; 100% passing the 1 in. sieve and at least 90% passing the No. 10 sieve; pH range of 6.0 to 7.0; minimum organic material content of 3 percent; reasonably free of subsoil, clay lumps, brush, and weeds; and free of extraneous matter harmful to plant growth.

B. Obtain imported topsoil from naturally well-drained local sources; do not obtain from bogs or marshes. Topsoil salvaged from within work area may be reused only if it meets the above requirements.

2.02 SALVAGED TOPSOIL

A. Loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing surface soil; 100% passing the 2 in. sieve; neither excessively acid, nor excessively alkaline; reasonably free of subsoil, clay lumps, brush, and weeds; and free of extraneous matter harmful to plant growth.

B. Obtain salvaged topsoil from within work area. If necessary to supplement insufficient quantities of salvaged topsoil, obtain additional topsoil from naturally well-drained local sources; do not obtain from bogs or marshes.

2.03 LIME

A. Agricultural grade limestone complying with requirements of WIDOT Std. Spec., Section 629.

2.04 FERTILIZER

A. Solid or liquid form, commercial fertilizer complying with WIDOT Std. Spec., Section 629, for Type A fertilizer.

2.05 SOD

A. Sod complying with WIDOT Std. Spec., Section 631, for lawn sod.

2.06 GRASS SEED

A. Seed complying with WIDOT Std. Spec., Section 630, for the seed mixtures indicated in Part 3 Execution for each type of turf replacement.

2.07 MULCH

A. Mulch materials complying with WIDOT Std. Spec., Section 627.

2.08 EROSION MAT

A. Erosion mat complying with WIDOT Std. Spec., Section 628, and WIDOT Erosion Control Product Acceptability List (PAL) for class and type of erosion mat indicated on the Drawings. If not indicated provide Class I Urban, Type B, erosion mat.

PART 3 EXECUTION

3.01 TURF REPLACEMENT, GENERAL

A. Comply with construction methods of WIDOT Std. Spec., unless otherwise indicated.

B. Place topsoil to depth indicated for type of turf replacement.

C. Apply lime to salvaged topsoil at a uniform rate of 100 lb per 1000 sq ft (based on index zone of 60-69) unless optional Contractor-furnished soil test results permit less. Liming is not required for imported topsoil meeting specified pH range.

D. Immediately prior to seeding or sodding, apply fertilizer at a rate of 7 lb per 1000 sq ft.

3.02 TYPE "A" TURF REPLACEMENT

A. Place 4 in. of imported topsoil, prepare soil, grade smooth, and lay sod.

3.03 TYPE "B" TURF REPLACEMENT

A. Place 4 in. of imported topsoil, prepare soil, and seed with WIDOT Std. Spec. Mixture No. 40 at the rate of 3 lb per 1000 sq ft. Seed using WIDOT Std. Spec., Section 630, Method A or Method B.

3.04 TYPE "C" TURF REPLACEMENT

A. Place 4 in. of salvaged topsoil, prepare soil, and seed with WIDOT Std. Spec. Mixture No. 10 (where average loam, heavy clay, or moist soils predominate) or WIDOT Std. Spec. Mixture No. 20 (where light, dry, well-drained, sandy or gravelly soils predominate) at a rate of 3 lb per 1000 sq ft. Seed using WIDOT Std. Spec., Section 630, Method A or Method B.

3.05 TYPE "D" TURF REPLACEMENT

A. Place 4 in. of salvaged topsoil, prepare soil, and seed with WIDOT Std. Spec. Mixture No. 20 at rate of 3 lb per 1000 sq ft. Seed using WIDOT Std. Spec., Section 630, Method A or Method B. Install erosion mat.

3.06 FIELD RESTORATION

A. Restoration of cultivated lands shall include salvaging full depth of topsoil, stockpiling, and replacing topsoil in an even layer at least 6 in. thick following backfilling.

3.07 MULCHING

A. Mulch all seeded areas at a uniform rate of 1/2 to 3 ton per acre (loose depth 1/2 to 1-1/2 in.), except where erosion mat is used. Anchor mulch using WIDOT Std. Spec., Section 627, Method A, B, or C.

3.08 EROSION MAT INSTALLATION

A. In all disturbed areas that are to be seeded erosion mats shall be installed and stapled according to manufacturer's recommendations.

3.09 MAINTENANCE

A. Maintain seeded/sodded areas for 30 days or until satisfactory growth has been achieved, whichever is longer. Maintenance shall include replacement of eroded areas, watering as needed to prevent burn off, and other work as necessary to establish healthy growth. Satisfactory growth for seeded areas shall be considered healthy grass growth with no bare spots larger than 6 in. square and total bare spots not exceeding 2 percent of total seeded area.

A. Owner will maintain seeded/sodded areas after placement of seed/sod. Contractor shall instruct Owner on required maintenance work.

B. Areas seeded after September 15 which fail to become established in the fall shall be reseeded and fertilized the following spring before June 1.

PART 4 SCHEDULES

4.01 TURF REPLACEMENT SCHEDULE

Location	Turf Replacement
ESLMD Property	Type A or B
Within CTH E R/W, Shoulders, Ditches, &Semi-Developed Grass Areas	Type C
Slopes Greater Than 3H:1V	Type D

END OF SECTION

SECTION 33 41 20

SITE STORM SEWER SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Provide site storm sewer system as shown and as specified. Comply with applicable provisions of Divisions 00 and 01.

1.02 RELATED SECTIONS

31 23 33 Trenching & Backfilling

1.03 SUBMITTALS

A. Shop Drawings: Submit manhole shop drawings.

B. Record Drawings: Accurately record locations of field changes on a set of Drawings. Prior to final application for payment, deliver record drawings to A/E.

C. Make submittals in accordance with Section 01 01 00/01 33 00.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Carefully unload and store pipe to prevent chipping, cracking, or damage to surface coatings. Pipe shall not be skidded upon ground. Repair damaged coatings.

PART 2 PRODUCTS

2.01 STORM SEWER PIPE, GENERAL

A. Storm sewer shall be of material and type indicated. If not designated, select one of the materials listed below; pipe used shall be recommended by manufacturer for intended purpose. Each pipe shall be stamped or indelibly marked with its type and class and manufacturer's name or mark.

B. Pipe material selected shall be approved under State Plumbing Code (Wis. Adm. Code, s. COMM 84) for use at the diameter shown on Drawings.

2.02 REINFORCED CONCRETE PIPE

A. ASTM C76 (circular pipe) or ASTM C507 (elliptical pipe), Class III minimum, unless otherwise designated. Joints shall be bell and spigot or tongue and groove type with rubber ring gasket, ASTM C443.

2.03 PVC SEWER PIPE

A. NOT USED

2.04 PVC CORRUGATED SEWER PIPE

A. NOT USED

2.05 PVC CLOSED-PROFILE SEWER PIPE

A. NOT USED

2.06 CORRUGATED POLYETHYLENE (PE) PIPE

A. NOT USED

2.07 MANHOLES AND INLETS

A. Manholes shall be precast concrete, ASTM C478. Manhole riser joints shall have rubber ring gaskets or plastic gasket material, or may use cement mortar. Pipe entrance holes shall have flexible, watertight, gasketed seals, or may use cement mortar.

B. Small inlets (36 in. or less diameter) shall be reinforced concrete pipe sections, ASTM C76, sizes as shown on Drawings. Rectangular inlets shall be precast reinforced concrete, 5 in. minimum wall and base thickness, dimensions as shown on Drawings. Inlet joints and pipe entrance holes shall have flexible, watertight, gasketed seals, or may use cement mortar.

2.08 CASTINGS

A. Provide castings for storm inlets, catch basins, and manholes as designated. Castings shall be cast iron, ASTM A48, Class 30, of uniform quality, free from blow holes, porosity, hard spots, shrinkage defects, cracks or other serious defects. Provide castings by Neenah Foundry, or approved equal.

2.09 APRON ENDWALLS

A. Pre-fabricated flared end sections of same material as sewer pipe or (if unavailable in pipe material) reinforced concrete. Provide suitable coupling or adaptor to attach endwall to selected storm sewer pipe material. Endwalls shall have trash guards, unless otherwise designated.

B. Tieing of last three joints of sewer pipe (as shown on Details) is only required where concrete pipe is used for storm sewer. Where another pipe material is used, provide full length section of pipe prior to apron endwall.

2.10 TRACER WIRE

A. Tracer wire shall be No. 12 AWG solid single copper wire with brown plastic coating. Tracer wire splices (if required) shall be made with inline resin splice kits.

PART 3 EXECUTION

3.01 LINE AND GRADE

A. Provide staking as required to install pipe and drainage structures to line and grade as shown on Drawings.

3.02 LAYING OF SEWER PIPE

A. Where practicable, begin at lowest point of proposed sewer line; lay with bell end or receiving groove edge upstream in direction of laying.

B. Cut in and connect to existing manhole(s) or sewer as required. When new sewer is connected to an existing sewer but not at a manhole, contact A/E if adjustments to inverts are required.

C. Sewer pipe shall be laid immediately following the trench preparation and bedding provisions of Section 31 23 33. Note particularly bedding and initial backfill requirements for flexible pipe (such as PVC and PE pipe).

D. Exercise care when handling pipe. Ropes, slings, or other devices must be used for lowering pipe into trench. Only pipe which is suitable for use is to remain on site. Damaged or broken pipe shall be immediately separated from acceptable pipe.

E. Lay pipe uniformly to line and grade on a prepared bed providing even support along entire barrel. Excavate bell holes in bedding material so pipe will rest on barrel and not on bell. As work progresses, interior of sewer shall be cleared of dirt and debris. Do not lay pipe where water is above bedding material except where A/E determines that foundation is stable, pipe will not be displaced upward, and joint construction will not be affected by water.

F. Each pipe shall be bedded by hand or by equally careful means to 12-in. cover before laying subsequent pipes. Fill space between pipe and trench wall in 6-in. layers and manually compact. Pipe sizes larger than 15-in. diameter may require mechanical compaction of bedding material.

G. When work is not in progress, water may be allowed to flow into newly laid pipe if provisions are made to prevent dirt from washing into pipe.

3.03 JOINTING

A. Joint materials and methods shall conform to manufacturer's recommendations and the following procedures.

B. Rubber-type gasket joint shall be made using lubricant of vegetable origin. If rubber gasket is O-ring type, groove in spigot shall be lubricated before setting gasket.

C. Joints for corrugated PE pipe shall be made in accordance with manufacturer recommendations.

3.04 INSTALLING MANHOLES AND INLETS

A. Storm manholes and inlets shall be constructed as shown. Steps 16 in. on center shall be provided wherever depth of manhole is greater than 5 ft. Castings shall be as shown on Details.

B. Manholes with more than one entrance pipe and manholes at changes in alignment or grade shall have formed flow channels with smooth radius transitions. For manholes with flexible seals, support pipe outside manholes by bedding as specified for type of pipe installed. For manholes with rigid seals, support pipe outside manholes until reaching undisturbed soil or to first joint by cast-in-place concrete or a wall of brick or concrete block contoured at top to fit lower 1/3 of pipe.

3.05 TRACER WIRE INSTALLATION

A. Install continuous tracer wire over all storm sewer.

1. Attach wire to top of pipe at approximately 10 ft intervals.
2. Provide an access point to wire at interior top of each manhole and inlet. Wire shall enter manhole or inlet between top of structure and adjusting rings. Core drill small hole in existing structures as needed to insert tracer wire. Provide sufficient slack left in wire length so that wire can be pulled to ground level for connection to locating transmitter.

B. Energize each installed tracer wire and verify that wire can be located with tracing equipment.

3.06 LEAKAGE INSPECTION

A. Storm sewer shall be inspected for excessive infiltration and sand leakage. Contractor shall repair infiltration and sand leaks which may cause a continued maintenance problem.

3.07 ALIGNMENT AND GRADE

A. Check alignment and grade by lamping method. If pipe shows poor alignment, offset or open joints, sags, or kinks, defects shall be corrected by Contractor before final acceptance. If closer inspection is warranted, Owner may arrange for a televised inspection. Owner will assume the cost of televised inspection if no serious defect is found. If defects are found due to failure of proper installation or materials, Contractor shall pay for test and promptly correct defects. Pipeline shall be relaid if lamp cannot be viewed between adjacent manholes.

3.08 DEFLECTION LIMITATION

A. Not Used.

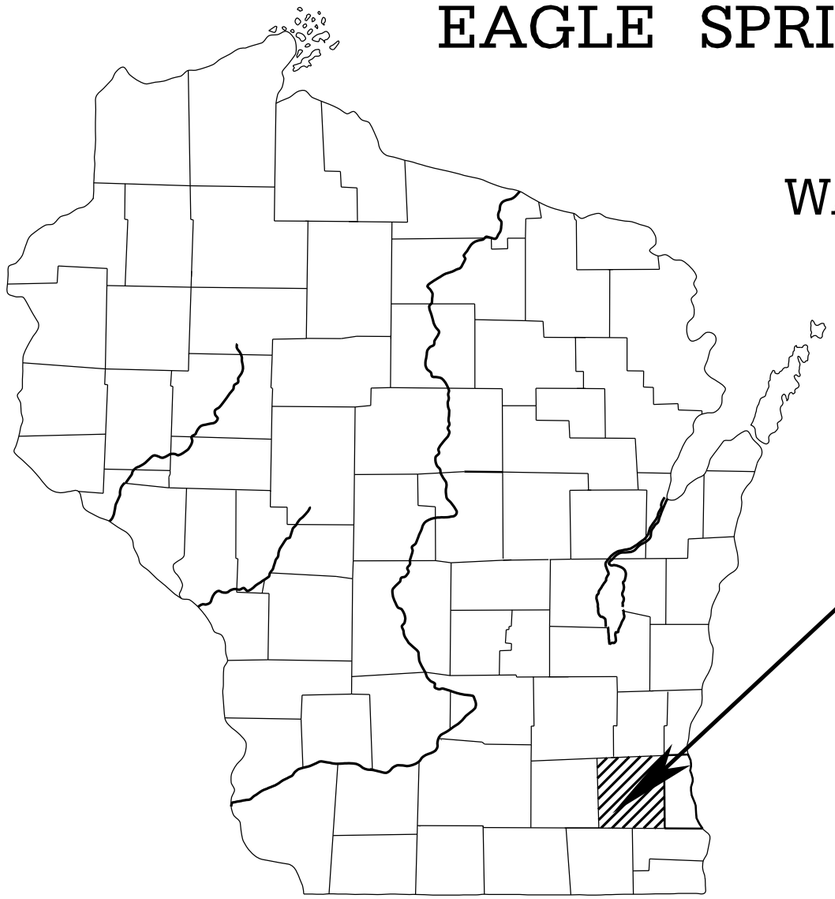
END OF SECTION

Appendix A
Drawings

EAGLE SPRING LAKE MANAGEMENT DISTRICT

EAGLE SPRING LAKE
TOWN OF EAGLE
WAUKESHA COUNTY, WISCONSIN

JUNE 24TH, 2011



PROJECT LOCATION

KROLL DAM
EAGLE SPRING LAKE, TOWN OF EAGLE, WAUKESHA COUNTY, WISCONSIN

PRELIMINARY

SHEET IDENTIFICATION

PLANS PREPARED BY

AYRES ASSOCIATES
ONE RIVERWOOD PLACE
N17 W24222 RIVERWOOD DRIVE, SUITE 310
WAUKESHA, WI 53188

$DATE$
PEN
$FILE$

DR.BY MSM	BOOK NO.	3	08/20/10	WDNR & COUNTY REVISIONS	6	06/24/11	WDNR REVISIONS
CHK.BY KKA	JOB NO. 51-0166.00	2	07/12/10	WDNR REVISIONS	5	05/20/11	WDNR SUBMITTAL
DATE MAR 2011	SCALE N.T.S.	1	05/18/10	PRELIMINARY CONCEPT	4	03/22/11	WAUKESHA COUNTY SUBMITTAL
		NO.	DATE	REVISION	NO.	DATE	REVISION

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

AYRES ASSOCIATES
Waukesha, Wisconsin

KROLL DAM
TITLE SHEET

DRAWING NO. G1
SHEET NO.

REV. 10/22/03

100 YEAR FLOOD LINE (821.1) IS 0.38' HIGHER THAN THE EXISTING LAKE ELEVATION. (LOCATION IS AT THE SHORE)

PARCELS ARE LIMITED TO ONE ACCESS POINT TO C.T.H. "E"

EAGLE SPRING LAKE

SCALE 1"=40'

EXISTING DWELLING

CONCRETE REPAIR WORK SEE SHEET C-5 FOR DETAILS

WORK NOT INCLUDED WITH THIS CONTRACT

SEE SHEET C-6 FOR CONNECTION DETAILS

EXISTING KROLL MILL RACE

EXISTING PROPERTY BOUNDARY

SILT FENCING SEE DETAIL 06

NEW 48" RCP CULVERT PIPE SEE DETAIL 01 FOR BEDDING

EXISTING 30" CULVERT PIPE

NEW 72" DIAMETER AREA INLET MANHOLE SEE DETAIL 02

EXISTING INLET MANHOLE WITH INLET PROTECTION SEE DETAIL 07

STONE TRACKING PAD SEE DETAIL 010

REMOVE & REPLACE BEAM GUARD FOR STORM SEWER INSTALLATION SEE SDD 14B 15-6A

EXISTING 30" CULVERT PIPE

MEDIUM RIPRAP SEE DETAIL 05

ASPHALT REPLACEMENT SEE DETAIL 03

NEW 48" RCP CULVERT PIPE

SEDIMENT LOGS SEE DETAIL 08

EROSION BALES SEE DETAIL 09

48" APRON ENDWALL SEE DETAIL 04

NEW AT-GRADE PLANTINGS WORK TO BE COMPLETED BY ESLMD DATE IS TBD

WORK NOT INCLUDED WITH THIS CONTRACT

27,284 SQ. FT. EXCL. OF R/W 0.64 ACRES

DEDICATED FOR PUBLIC ROAD PURPOSES

ASPHALT ROAD

ORIGINAL LOT LINE

NORTHEAST CORNER OF LOT 1 BLOCK 2, ISLAND VIEW SUBDIVISION.

FOUND P.K. NAIL

FOUND P.K. NAIL

LEGEND

824.6 EXISTING SPOT ELEVATIONS

FOUND 1" IRON PIPE

FOUND P.K. NAIL

SET 1" IRON PIPE

DR.BY MSM	BOOK NO.	3	08/20/10	WDNR & COUNTY REVISIONS	6	06/24/11	WDNR REVISIONS
CHK.BY KKA	JOB NO. 51-0166.00	2	07/12/10	WDNR REVISIONS	5	05/20/11	WDNR SUBMITTAL
DATE MAR 2011	SCALE 1" = 40'	1	05/18/10	PRELIMINARY CONCEPT	4	03/22/11	WAUKESHA COUNTY SUBMITTAL
		NO.	DATE	REVISION	NO.	DATE	REVISION

$DATE$
PEN
$FILE$

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

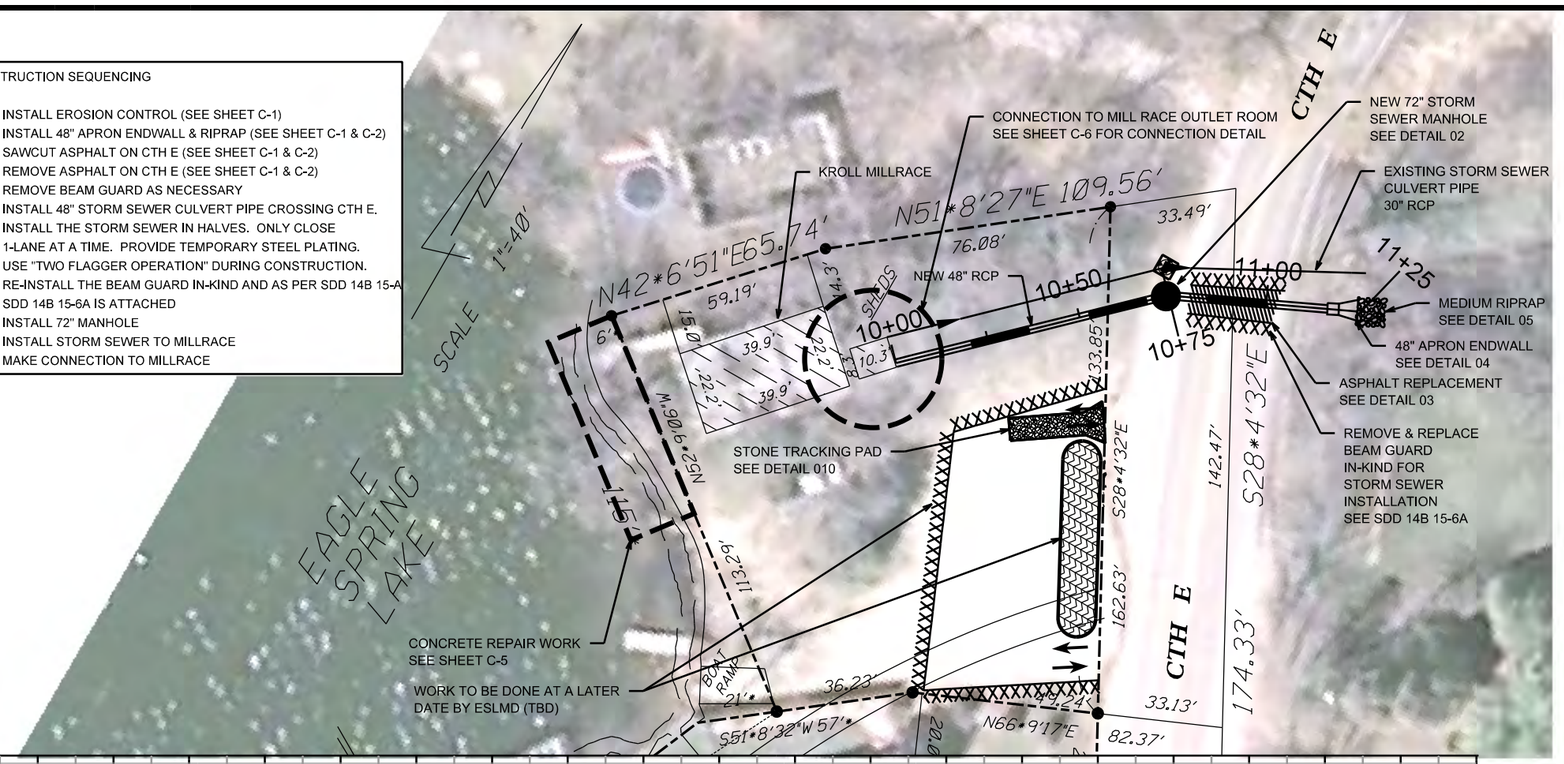
AYRES ASSOCIATES
Waukesha, Wisconsin

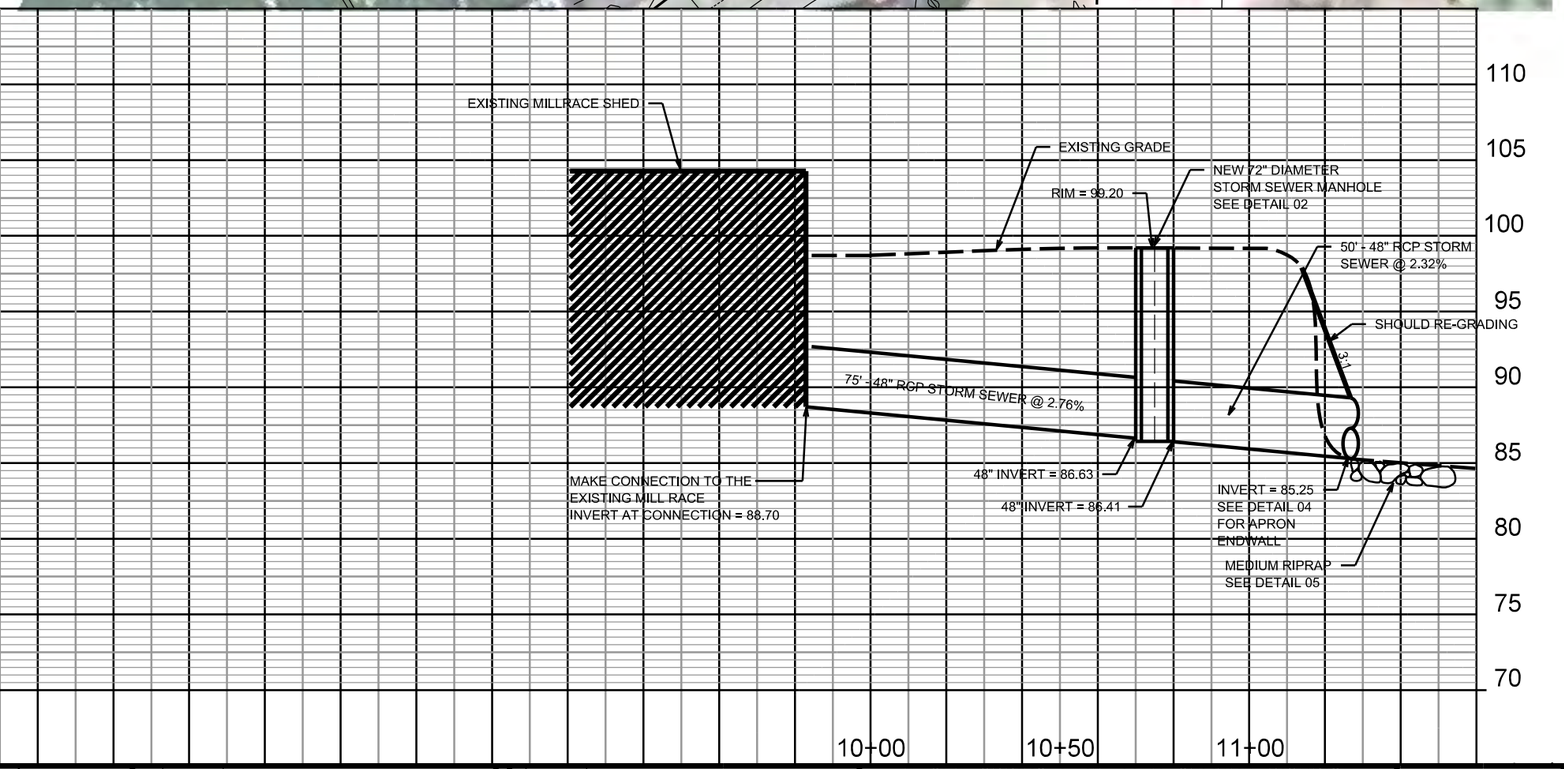
KROLL DAM
PROPOSED SITE PLAN & CULVERT CROSSING

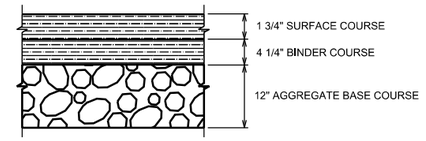
DRAWING NO. C-1
SHEET NO.

CONSTRUCTION SEQUENCING

1. INSTALL EROSION CONTROL (SEE SHEET C-1)
2. INSTALL 48" APRON ENDWALL & RIPRAP (SEE SHEET C-1 & C-2)
3. SAWCUT ASPHALT ON CTH E (SEE SHEET C-1 & C-2)
4. REMOVE ASPHALT ON CTH E (SEE SHEET C-1 & C-2)
5. REMOVE BEAM GUARD AS NECESSARY
6. INSTALL 48" STORM SEWER CULVERT PIPE CROSSING CTH E. INSTALL THE STORM SEWER IN HALVES. ONLY CLOSE 1-LANE AT A TIME. PROVIDE TEMPORARY STEEL PLATING. USE "TWO FLAGGER OPERATION" DURING CONSTRUCTION.
7. RE-INSTALL THE BEAM GUARD IN-KIND AND AS PER SDD 14B 15-A SDD 14B 15-6A IS ATTACHED
8. INSTALL 72" MANHOLE
9. INSTALL STORM SEWER TO MILLRACE
10. MAKE CONNECTION TO MILLRACE







ASPHALT PLACEMENT
(IF OPEN-CUT CTH E)

03 ASPHALT REPLACEMENT

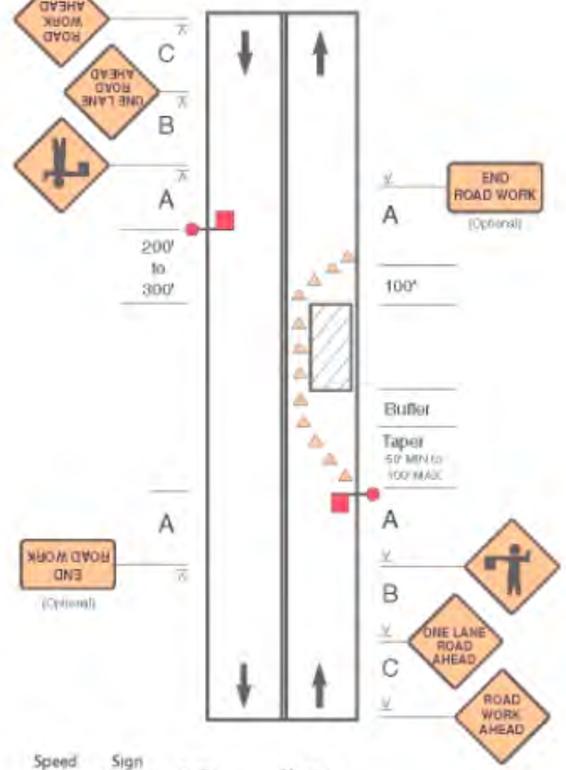
NTS

ST301

25

Lane Closure on a Two-Lane Road

(Two Flagger Operation)



Speed Limit (mph)	Sign Spacing A, B, C (ft)	Buffer (ft)
25	200	155
30	200	200
35	350	250
40	350	305
45	500	360
50	500	425
55	500	495

Notes

1. The flaggers shall use approved flagging procedures according to the MUTCD and as shown on page 56.
2. For short duration work (60 minutes or less), the ROAD WORK AHEAD sign may be omitted.

$TIMES
$DATES
$PENS
$FILES

DR.BY	BOOK NO.
MSM	
CHK.BY KKA	JOB NO. 51-0166.00
DATE MAR 2011	SCALE

NO.	DATE	REVISION
3	08/20/10	WDNR & COUNTY REVISIONS
2	07/12/10	WDNR REVISIONS
1	05/18/10	PRELIMINARY CONCEPT

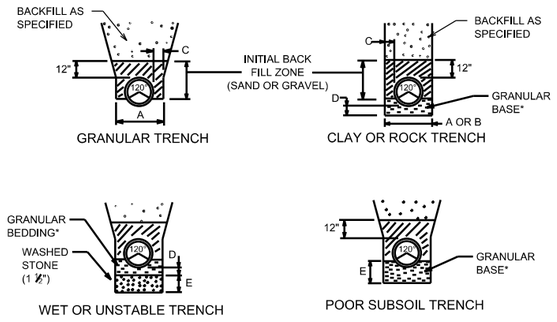
NO.	DATE	REVISION
6	06/24/11	WDNR REVISIONS
5	05/20/11	WDNR SUBMITTAL
4	03/22/11	WAUKESHA COUNTY SUBMITTAL

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

AYRES ASSOCIATES
Waukesha, Wisconsin

KROLL DAM
CULVERT CROSS SECTION

DRAWING NO. C-2
SHEET NO.



*FOR FLEXIBLE PIPE, BEDDING OR BASE MATERIAL SHALL EXTEND TO SPRING LINE (MID HEIGHT) OF PIPE.

A=O.D. PIPE + 24"(MAX)
B=O.D. PIPE + 18"(MAX) FOR ROCK
C=6" MIN.

D=4" BELOW BARREL FOR CLAY
3" BELOW BELL FOR CLAY
6" BELOW BARREL FOR ROCK
E=DETERMINED BY A/E

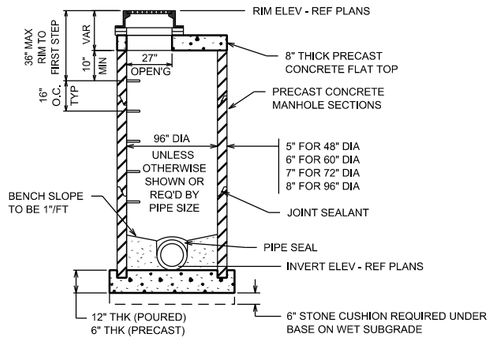
01 TRENCH SECTIONS
NTS **GN100**

CASTING:

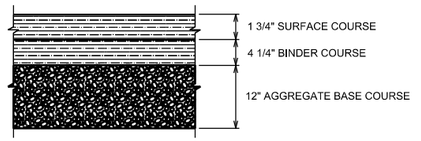
NEENAH FOUNDRY CO
R-1550 FRAME WITH
TYPE 'G' GRATE

OR APPROVED EQUAL.

ADJUST FRAME TO GRADE WITH A MINIMUM OF TWO ADJUSTING RINGS TOTALING 6" MIN TO 12" MAX

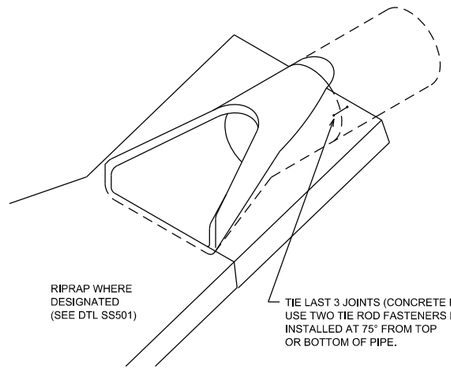


02 72" AREA INLET MANHOLE
NTS **SS102**

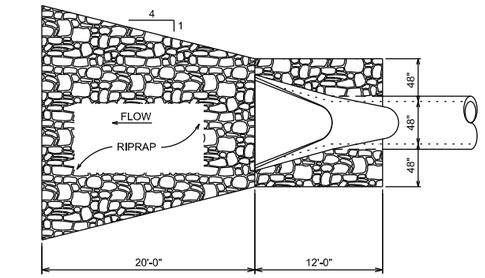


ASPHALT PLACEMENT
(IF OPEN-CUT CTH E)

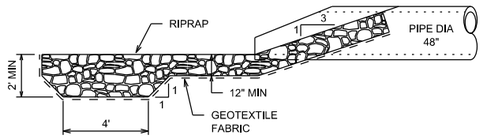
03 ASPHALT REPLACEMENT
NTS **ST301**



04 48" APRON ENDWALL W/TRASH GUARD
NTS **SS500**



PLAN

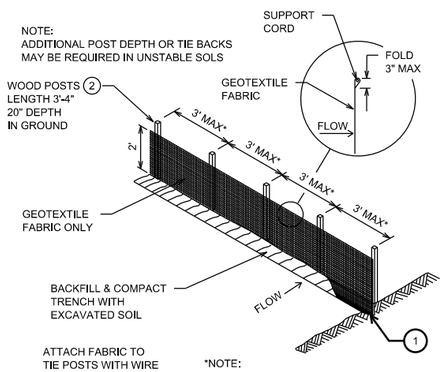


SECTION

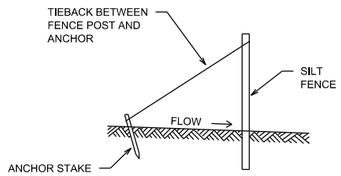
05 RIPRAP - STORM SEWER OUTLETS
NTS **SS501**

GENERAL NOTES

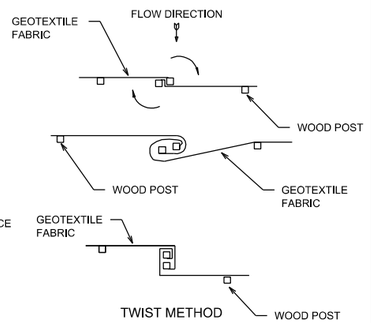
1. TRENCH SHALL BE A MIN OF 4" WIDE & 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC, FOLD THE MATERIAL TO FIT TRENCH AND BACKFILL & COMPACT TRENCH WITH EXCAVATED SOIL.
2. WOOD POSTS SHALL BE A MIN SIZE OF 1½" x 1½" OAK OR HICKORY.
3. CONSTRUCT SILT FENCE FROM A CONTINUOUS ROLL IF POSSIBLE BY CUTTING LENGTHS TO AVOID JOINTS. IF A JOINT IS NECESSARY, USE ONE OF THE FOLLOWING TWO METHODS:
   A. TWIST METHOD – OVERLAP THE END POSTS AND TWIST, OR ROTATE, AT LEAST 180 DEGREES.
   B. HOOK METHOD – HOOK THE END OF EACH SILT FENCE LENGTH.



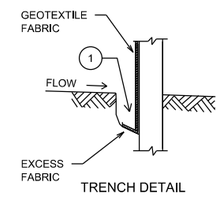
SILT FENCE



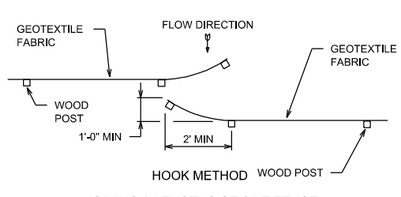
SILT FENCE TIE BACK
(WHEN ADDITIONAL SUPPORT REQUIRED)



TWIST METHOD



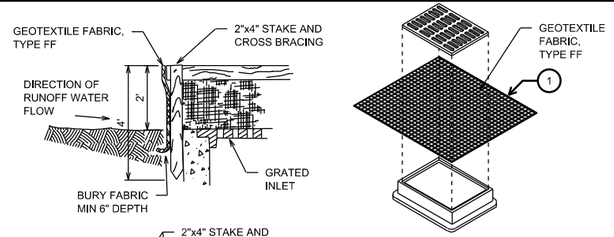
TRENCH DETAIL

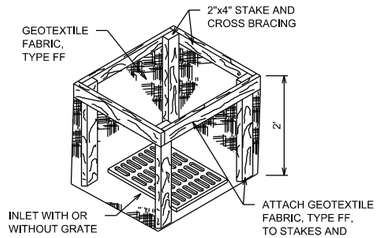


HOOK METHOD

JOINING 2 LENGTHS OF SILT FENCE

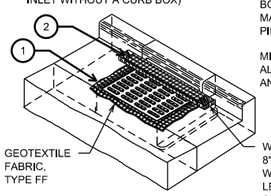
06 SILT FENCE
NTS **SP100**



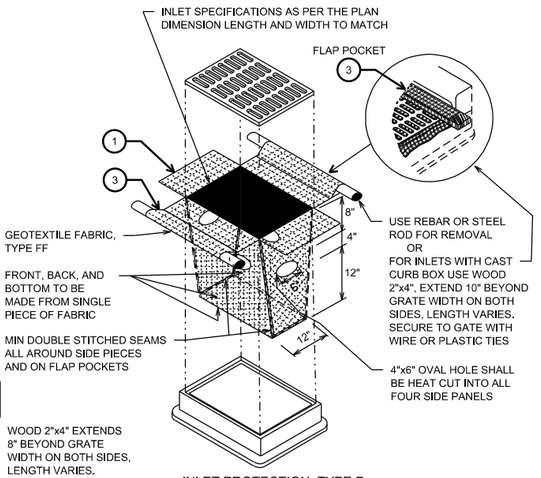


INLET PROTECTION, TYPE A

INLET PROTECTION, TYPE B
(WITHOUT CURB BOX)
(CAN BE INSTALLED IN ANY INLET WITHOUT A CURB BOX)



INLET PROTECTION, TYPE C
(WITH CURB BOX)



INLET PROTECTION, TYPE D
(WITHOUT CURB BOX)
(CAN BE INSTALLED IN ANY INLET TYPE WITH OR WITHOUT A CURB BOX AS PER NOTE 2)

GENERAL NOTES
-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 IN TO HE 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 A WOOD 2x4.

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, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL CINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED AT A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.

07 INLET PROTECTION
NTS **SS302**

$DATE$
PEN
$FILE$

DR.BY MSM	BOOK NO.
CHK.BY KKA	JOB NO. 51-0166.00
DATE MAR 2011	SCALE

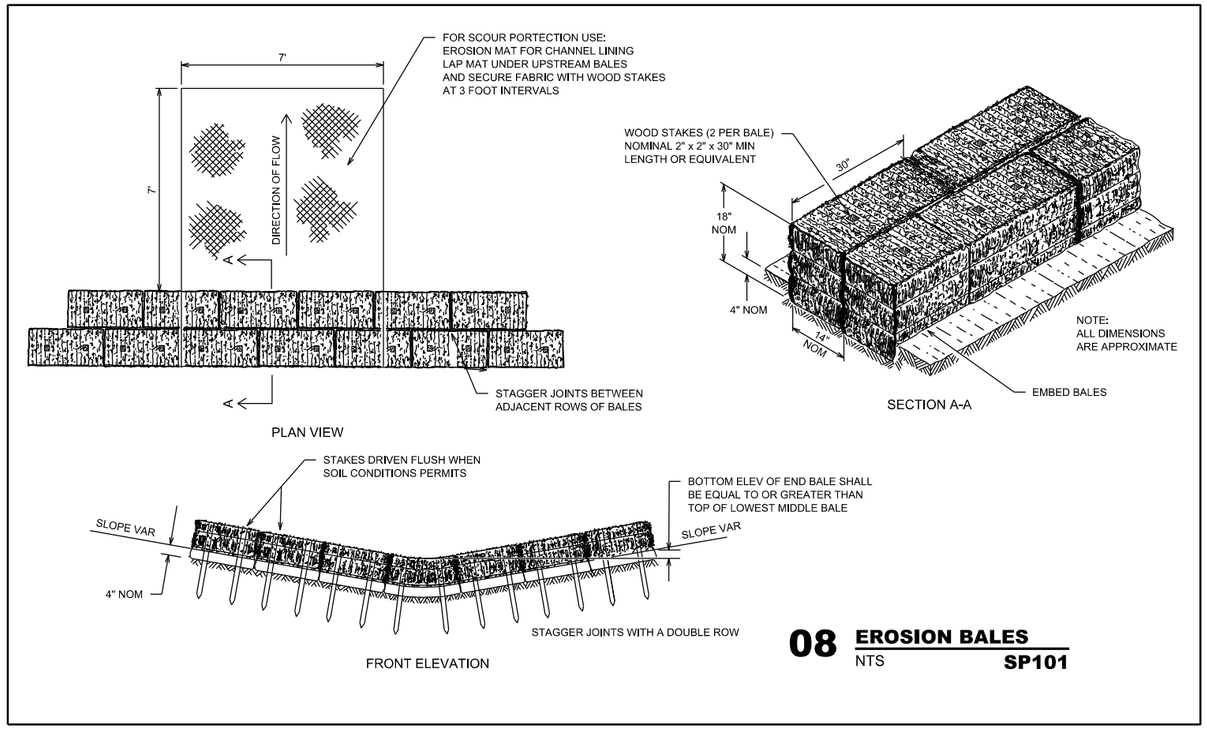
NO.	DATE	REVISION
3	08/20/10	WDNR & COUNTY REVISIONS
2	07/12/10	WDNR REVISIONS
1	05/18/10	PRELIMINARY CONCEPT
6	06/24/11	WDNR REVISIONS
5	05/20/11	WDNR SUBMITTAL
4	03/22/11	WAUKESHA COUNTY SUBMITTAL

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

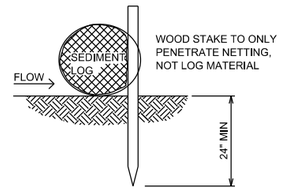
AYRES ASSOCIATES
Waukesha, Wisconsin

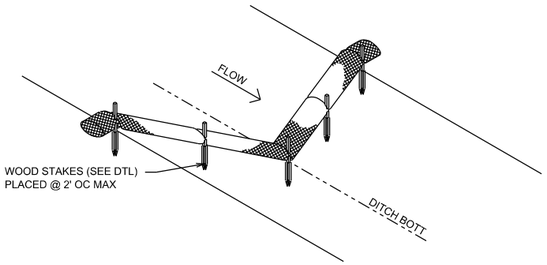
KROLL DAM
CONSTRUCTION DETAILS

DRAWING NO. C-3
SHEET NO.

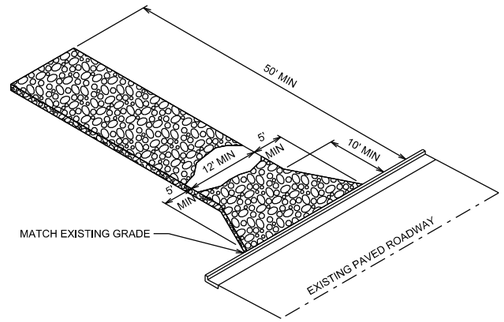


08 **EROSION BALES**
NTS **SP101**

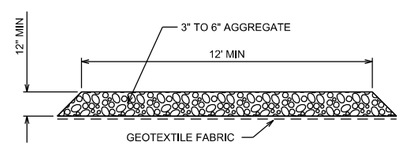




09 **SEDIMENT LOG**
NTS **SP102**



PLAN



SECTION

010 **STONE TRACKING PAD**
NTS **GN101**

$DATE$
PEN
$FILE$

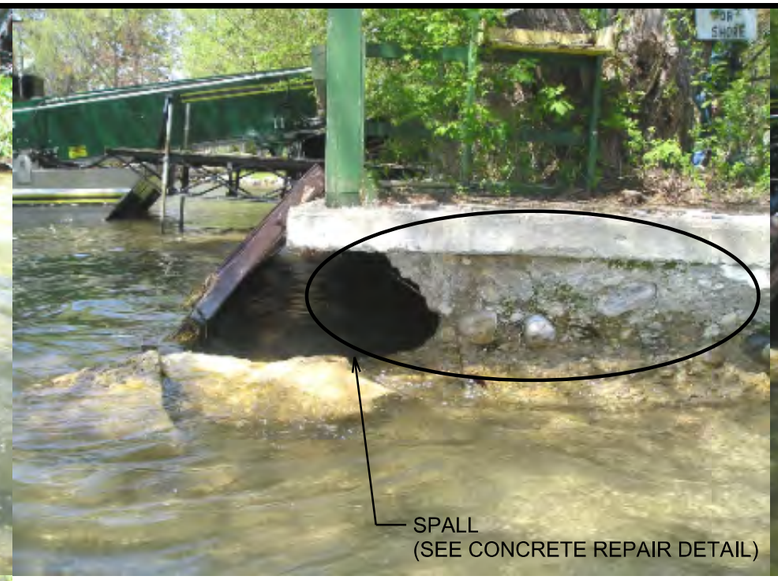
DR.BY MSM	BOOK NO.	3	08/20/10	WDNR & COUNTY REVISIONS	6	06/24/11	WDNR REVISIONS
CHK.BY KKA	JOB NO. 51-0166.00	2	07/12/10	WDNR REVISIONS	5	05/20/11	WDNR SUBMITTAL
DATE MAR 2011	SCALE	1	05/18/10	PRELIMINARY CONCEPT	4	03/22/11	WAUKESHA COUNTY SUBMITTAL
		NO.	DATE	REVISION	NO.	DATE	REVISION

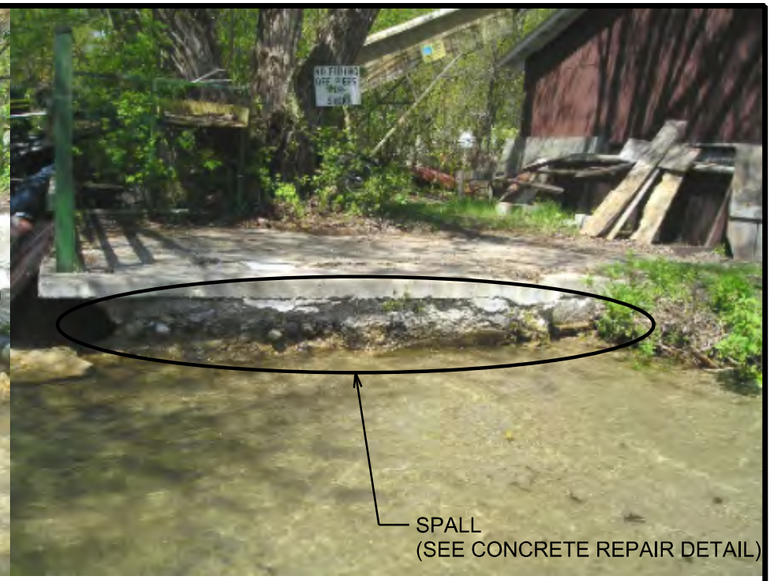
EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

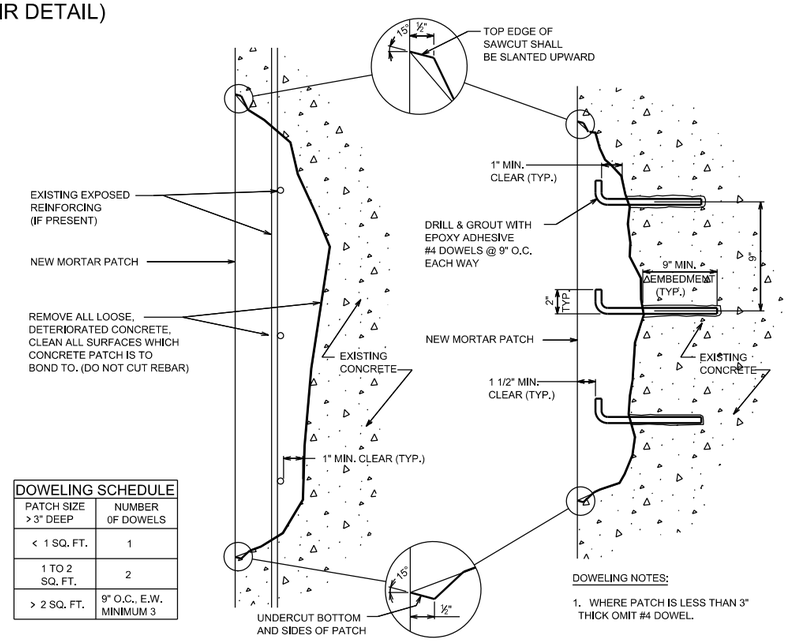
AYRES ASSOCIATES
Waukesha, Wisconsin

KROLL DAM
CONSTRUCTION DETAILS

DRAWING NO. C-4
SHEET NO.







DOWELING SCHEDULE	
PATCH SIZE > 3" DEEP	NUMBER 0F DOWELS
< 1 SQ. FT.	1
1 TO 2 SQ. FT.	2
> 2 SQ. FT.	9" O.C., E.W. MINIMUM 3

DOWELING NOTES:

1. WHERE PATCH IS LESS THAN 3" THICK OMIT #4 DOWEL.

TYPICAL SPALL REPAIR
WITH REBAR EXPOSED

TYPICAL SPALL REPAIR
WHERE REBAR IS NOT EXPOSED

011 CONCRETE REPAIR DETAIL

N.T.S. 0373001

$DATE$
PEN
$FILE$

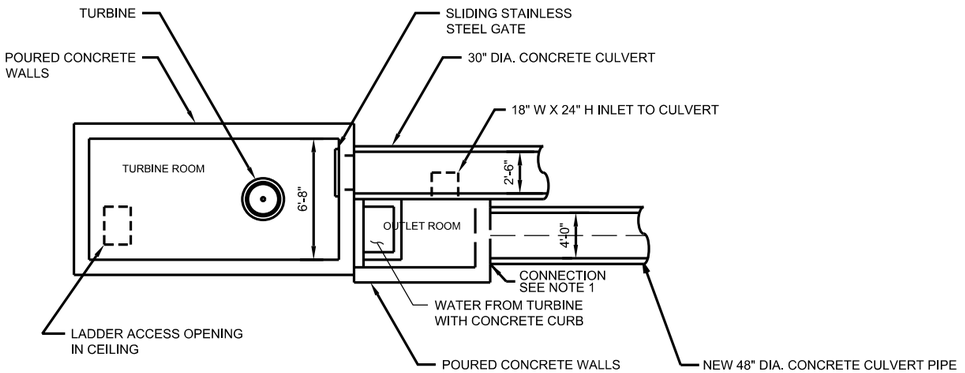
DR.BY MSM	BOOK NO.	3	08/20/10	WDNR & COUNTY REVISIONS	6	06/24/11	WDNR REVISIONS
CHK.BY KKA	JOB NO. 51-0166.00	2	07/12/10	WDNR REVISIONS	5	05/20/11	WDNR SUBMITTAL
DATE MAR 2011	SCALE	1	05/18/10	PRELIMINARY CONCEPT	4	03/22/11	WAUKESHA COUNTY SUBMITTAL
		NO.	DATE	REVISION	NO.	DATE	REVISION

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

AYRES ASSOCIATES
Waukesha, Wisconsin

KROLL DAM
CONSTRUCTION DETAILS - CONCRETE REPAIR

DRAWING NO. C-5
SHEET NO.

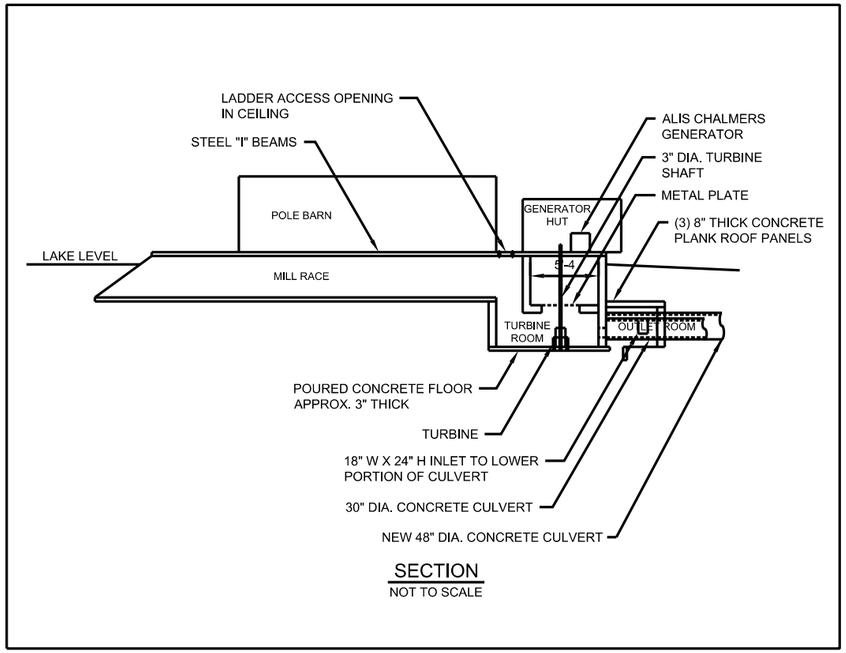


FLOOR PLAN
NOT TO SCALE

NOTE 1:

A. PROVIDE CONCRETE ENVELOPE OUTSIDE OF THE EXISTING WALL CONCRETE ENVELOPE SHALL FULLY ENCASE PIPE 4-INCHES BELOW THE BOTTOM, 4-INCHES ABOVE THE TOP, AND AT LEAST 6-INCHES OUT FROM ALL SIDES.

B. SEAL CONNECTION WITH RIGID (MORTAR) SEALS, SUPPORT PIPE OUTSIDE UNTIL REACHING THE UNDISTURBED SOIL OR TO FIRST JOINT OF PIPE BY A 6-INCH THICK WALL OF CAST-IN-PLPACE CONCRETE, BRICK, OR SOLID CONCRETE BLOCK CONTOURED AT TOP TO FIT LOWER 1/3 OF PIPE.



SECTION
NOT TO SCALE

6/24/2011
PEN
Z:\Civil\ESLMD\CAD\C-6_Connection Detail.dgn

DR.BY MSM	BOOK NO.
CHK.BY KKA	JOB NO. 51-0166.00
DATE MAR 2011	SCALE

NO.	DATE	REVISION
3	08/20/10	WDNR & COUNTY REVISIONS
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NO.	DATE	REVISION
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EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

AYRES ASSOCIATES
Waukesha, Wisconsin

KROLL DAM
CONSTRUCTION DETAILS - CONNECTION DETAIL

DRAWING NO. C-6
SHEET NO.

GENERAL NOTES

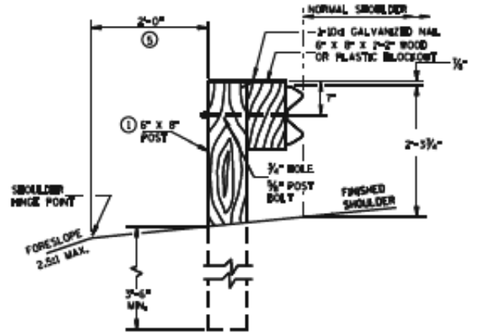
DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS, AND THE APPLICABLE SPECIAL PROVISIONS.

1. W6 X 9 OR W6 X 8.5 STEEL POSTS AND NOTCHED PLASTIC BLOCKOUTS ARE ACCEPTABLE ALTERNATIVES FOR 6" X 8" WOOD POSTS WITH WOOD OR PLASTIC BLOCKOUTS. USE APPROVED NOTCHED PLASTIC BLOCKOUTS WITH STEEL POSTS. APPROVED PLASTIC BLOCKOUT DESIGNS MAY VARY FROM THIS TYPICAL DETAIL WHEN USED IN CONJUNCTION WITH STEEL POSTS.

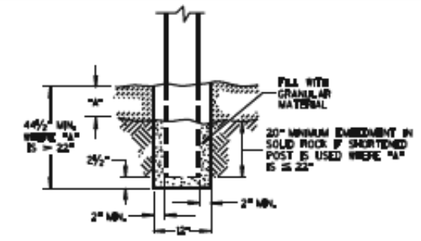
   DO NOT MIX STEEL POSTS AND WOOD POSTS IN A SINGLE INSTALLATION.
2. USE STRUCTURAL STEEL POSTS CONFORMING TO ASTM A 36. GALVANIZED POSTS ACCORDING TO AASHTO M 111. EITHER SET THE POSTS IN DRILLED HOLES OR DRIVE TO GRADE. REMOVE MUSHROOMING CAUSED BY DRIVING AND REPAIR DAMAGED SPELTER COATING ON GALVANIZED POSTS.
3. INSTALL STEEL POSTS WITH HOLES ON APPROACHING TRAFFIC SIDE.
4. USE EITHER WOOD OR APPROVED PLASTIC BLOCKOUTS ON WOOD POSTS.
5. IF THE DISTANCE FROM BACK OF POST TO SHOULDER HINGE POINT IS LESS THAN 2 FEET INSTALL LONGER POST AT HALF POST SPACING, W BEAM (LHW).
6. IF ROCK IS ENCOUNTERED DURING EXCAVATION, THE ENGINEER MAY APPROVE USING A 12 INCH DIAMETER POST HOLE EXTENDING 20 INCHES DEEP INTO THE ROCK. PLACE GRANULAR MATERIAL IN THE BOTTOM OF THE HOLE APPROXIMATELY 2½ INCHES DEEP. CUT THE POSTS TO LENGTH AND PLACE IN THE HOLE. BACKFILL WITH MATERIAL EXCAVATED FROM THE HOLE AND COMPACT ADEQUATELY.

INSTALL BEAM GUARD SECTIONS AND ALL NECESSARY HARDWARE ACCORDING TO THE APPLICABLE PLAN AND CURRENT STANDARD AND SUPPLEMENTAL SPECIFICATIONS.

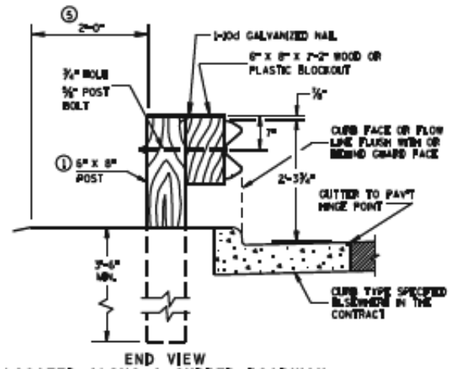
ALL DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCES EXCEPT WHERE ALLOWABLE TOLERANCES ARE SHOWN.



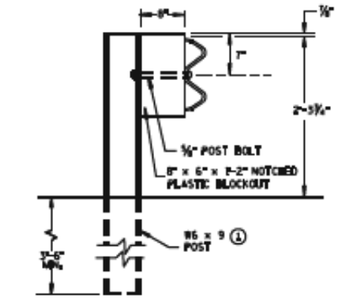
END VIEW
LOCATED ALONG A ROADWAY SHOULDER
STANDARD INSTALLATION



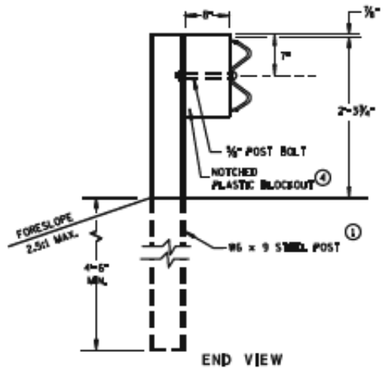
END VIEW
SETTING STEEL OR WOOD POST IN ROCK ⑥



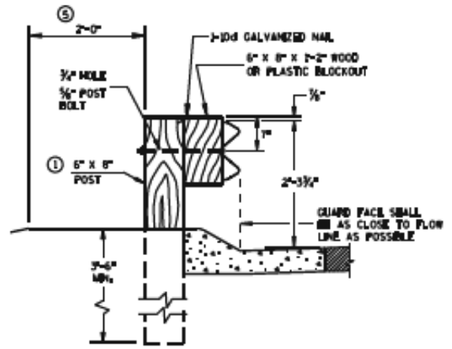
END VIEW
LOCATED ALONG A CURBED ROADWAY



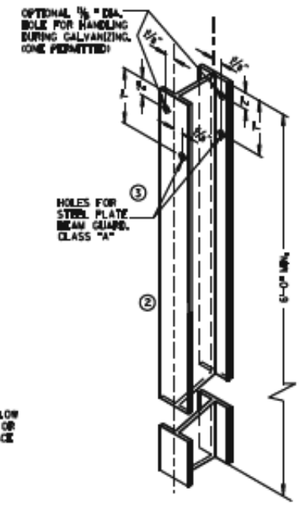
END VIEW
STEEL POST & NOTCHED
PLASTIC BLOCKOUT ALTERNATIVE
STANDARD INSTALLATION



END VIEW
LONGER POST AT HALF
POST SPACING W BEAM
(LHW)

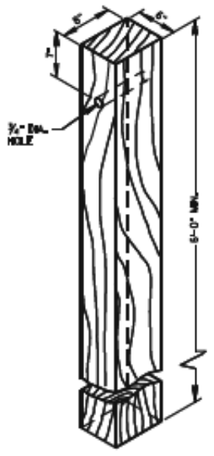


END VIEW
LOCATED ALONG A
MOUNTABLE CURBED ROADWAY

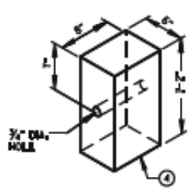


STEEL POST &
HOLE PUNCHING DETAIL
(W6 X 9) ①

ALL HOLES ⅝" DIAMETER EXCEPT AS NOTED

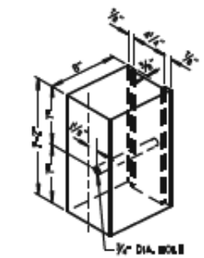


WOOD POST
(6"X8") NOMINAL



WOOD OR PLASTIC
BLOCKOUT FOR
WOOD POSTS

PLAN VIEW
WOOD POST,
BLOCKOUT & BEAM



TYPICAL NOTCHED ①
PLASTIC BLOCKOUT
FOR STEEL POSTS

PLAN VIEW
STEEL POST, NOTCHED
PLASTIC BLOCKOUT & BEAM

TYPICAL INSTALLATION OF STEEL PLATE BEAM GUARD

STEEL PLATE BEAM GUARD,
CLASS "A"
INSTALLATION & ELEMENTS

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

S.D.D. 14 B 15-60

S.D.D. 14 B 15-60a

6

6

6/24/2011
$PENS
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DR.BY	BOOK NO.
MSM	
CHK.BY	JOB NO.
KKA	51-0166.00
DATE MAR 2011	SCALE

NO.	DATE	REVISION
3	08/20/10	WDNR & COUNTY REVISIONS
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1	05/18/10	PRELIMINARY CONCEPT

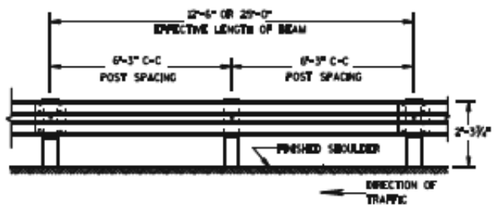
NO.	DATE	REVISION
A	06/24/11	WDNR REVISIONS
5	05/20/11	WDNR SUBMITTAL
4	03/22/11	WAUKESHA COUNTY SUBMITTAL

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

AYRES ASSOCIATES
Waukesha, Wisconsin

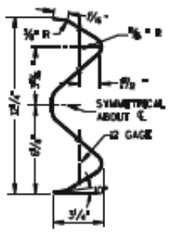
KROLL DAM
CONSTRUCTION DETAILS - BEAM GUARD

DRAWING NO. C-7
SHEET NO.

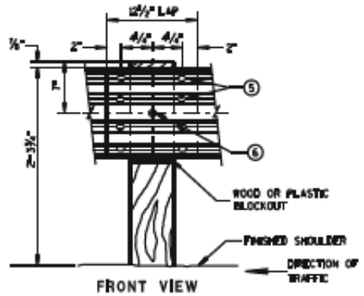


FRONT VIEW

POST SPACING STANDARD INSTALLATION



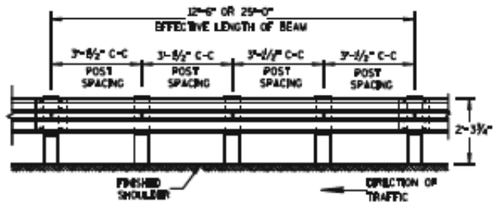
SECTION THRU W BEAM



FRONT VIEW
BEAM SPLICE AT WOOD POST
AND POST MOUNTING DETAIL

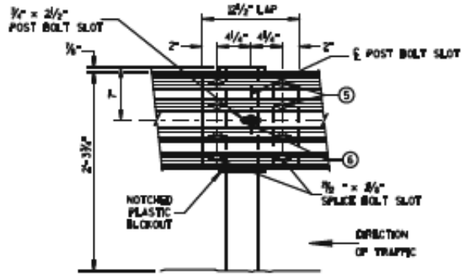
GENERAL NOTES

1. PROVIDE TYPE "H" SILVER REFLECTIVE SHEETING ON ALL REFLECTORS EXCEPT THOSE LOCATED ALONG THE LEFT EDGE OF ONE-WAY ROADWAYS, WHICH SHALL BE PROVIDED WITH TYPE "H" YELLOW REFLECTIVE SHEETING.
2. DO NOT INSTALL REFLECTORS ON THE FIRST 50 FEET OF THE APPROACH END OF THE ENERGY ABSORBING TERMINAL.
3. REVERSE EVERY OTHER REFLECTOR FOR 2-WAY VISIBILITY, THE CONTRACTOR MAY FURNISH TWO-SIDED REFLECTORS IN LIEU OF ONE-SIDED REFLECTORS.
4. PROVIDE AN ANGLE OF BEND OF 90° & 1" FOR TWO-SIDED REFLECTORS.
5. 8 -⅝" ø X 2 " BUTTON HEAD BOLTS WITH OVAL SHOULDERS & RECESS NUTS.
6. ⅝" ø X 1'-6" BUTTON HEAD BOLT AND AND RECESS NUT WITH ROUND WASHER UNDER NUT.



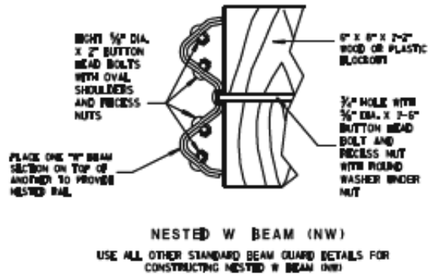
FRONT VIEW

POST SPACING FOR LONGER POST
AT HALF POST SPACING W BEAM (LHW)



FRONT VIEW
BEAM SPLICE AT STEEL POST

TYPICAL SPLICING DETAILS
OF STEEL PLATE BEAM GUARD

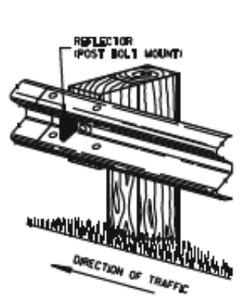


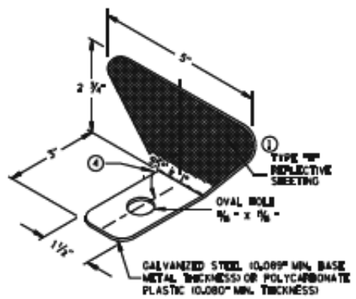
NESTED W BEAM (NW)

USE ALL OTHER STANDARD BEAM GUARD DETAILS FOR CONSTRUCTING NESTED W BEAM (NW)

REFLECTOR SPACING ②

	BEAM GUARD LENGTH	REFLECTOR SPACING	NO. SURFACES REFLECTORIZED	MIN. NO. REFLECTORS
ONE WAY TRAFFIC	< 200'	50'C-C	1	3
	> 200'	100'C-C	1	
TWO WAY TRAFFIC	< 200'	25'C-C	1 ③	6
	> 200'	50'C-C	1	
TWO WAY TRAFFIC	< 200'	50'C-C	2 ④	5
	> 200'	100'C-C	2	





ONE SIDED REFLECTOR DETAIL AND TYPICAL INSTALLATION ①

STEEL PLATE BEAM GUARD,
CLASS "A",
INSTALLATION & ELEMENTS

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

S.D.D. 14 B 15-6b

6

6/24/2011
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DR.BY	BOOK NO.
MSM	
CHK.BY KKA	JOB NO. 51-0166.00
DATE MAR 2011	SCALE

NO.	DATE	REVISION
3	08/20/10	WDNR & COUNTY REVISIONS
2	07/12/10	WDNR REVISIONS
1	05/18/10	PRELIMINARY CONCEPT

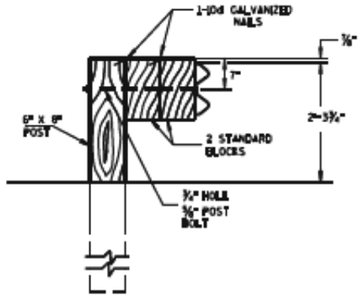
NO.	DATE	REVISION
⚠6	06/24/11	WDNR REVISIONS
5	05/20/11	WDNR SUBMITTAL
4	03/22/11	WAUKESHA COUNTY SUBMITTAL

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

AYRES ASSOCIATES
Waukesha, Wisconsin

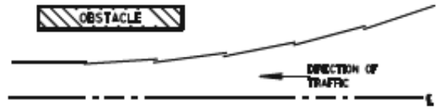
KROLL DAM
CONSTRUCTION DETAILS - BEAM GUARD

DRAWING NO. C-8
SHEET NO.

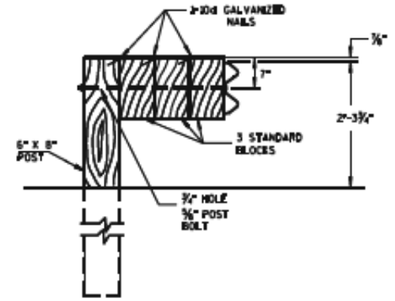


DETAIL FOR DOUBLE BLOCKS

THE NUMBER OF DOUBLE BLOCK POSTS WITHIN A BARRIER RUN IS UNLIMITED

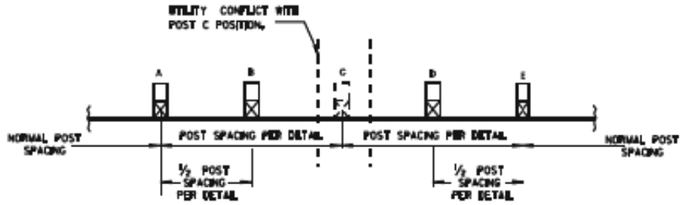


PLAN VIEW
BEAM LAPPING DETAIL



DETAIL FOR TRIPLE BLOCKS

TRIPLE BLOCK DETAIL IS LIMITED TO ONE LOCATION WITHIN A BEAM GUARD RUN.



POST DRIVING FOR CONTINUOUS UNDERGROUND OBSTRUCTION

NOTES: USE DOUBLE OR TRIPLE BLOCKS WHEN UNDERGROUND OBSTACLES PREVENT THE POST FROM BEING INSTALLED.

DO NOT USE EXTRA BLOCKOUTS IF IT CAUSES THE POST TO BE DRIVEN BEYOND SHOULDER HINGE POINT OR CAUSES A FIXED OBJECT TO BE WITHIN THE DEFLECTION DISTANCE OF THE BARRIER.

6

S.D.D. 14 B 15-6c

STEEL PLATE BEAM GUARD, CLASS "A", INSTALLATION & ELEMENTS

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

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S.D.D. 14 B 15-6c

6/24/2011
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DR.BY	BOOK NO.
MSM	
CHK.BY	JOB NO.
KKA	51-0166.00
DATE	SCALE
MAR 2011	

NO.	DATE	REVISION
3	08/20/10	WDNR & COUNTY REVISIONS
2	07/12/10	WDNR REVISIONS
1	05/18/10	PRELIMINARY CONCEPT

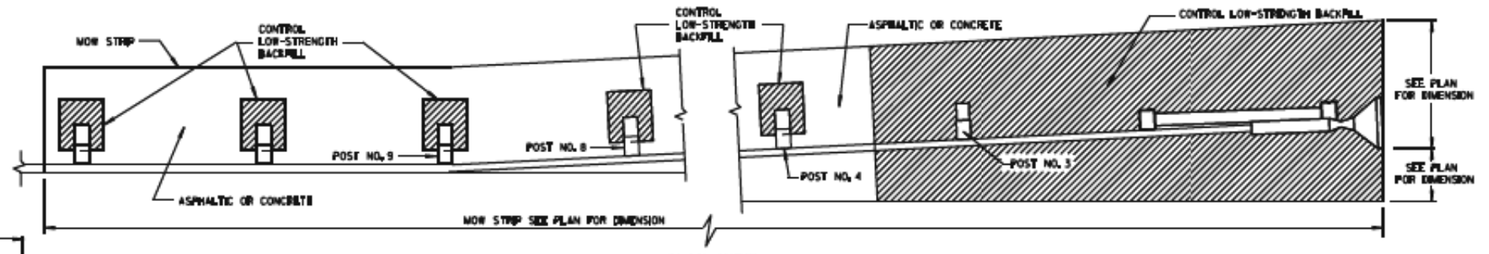
NO.	DATE	REVISION
6	06/24/11	WDNR REVISIONS
5	05/20/11	WDNR SUBMITTAL
4	03/22/11	WAUKESHA COUNTY SUBMITTAL

EAGLE SPRING LAKE MANAGEMENT DISTRICT
KROLL DAM
UPGRADES & SITE PLAN

AYRES ASSOCIATES
Waukesha, Wisconsin

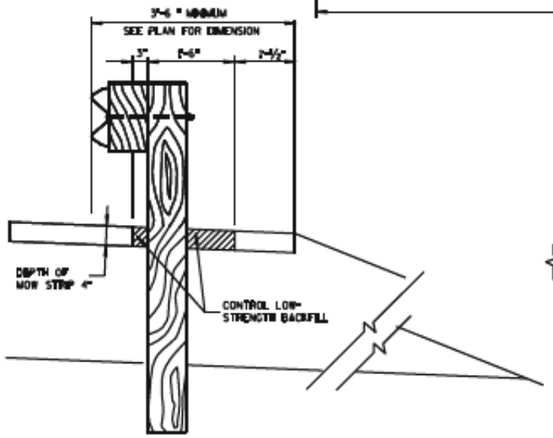
KROLL DAM
CONSTRUCTION DETAILS - BEAM GUARD

DRAWING NO. C-9
SHEET NO.

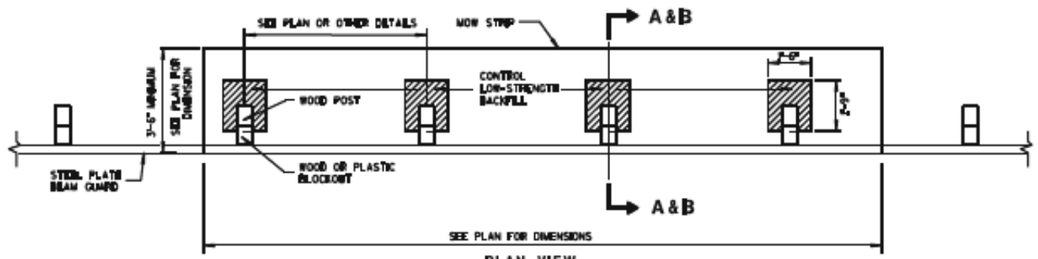


PLAN VIEW

MOW STRIP FOR STEEL PLATE BEAM GUARD ENERGY ABORBING TERMINAL

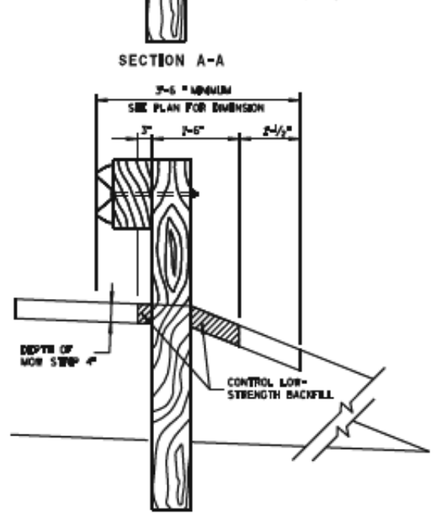


SECTION A-A

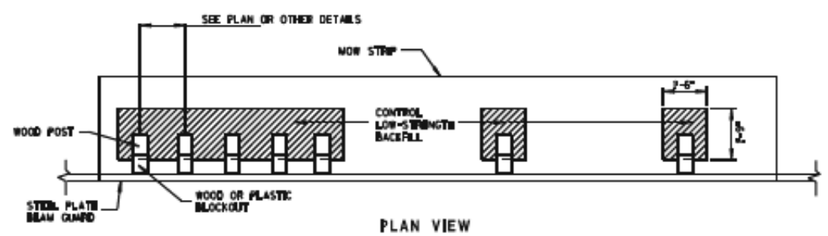


PLAN VIEW

MOW STRIP FOR TYPICAL BLOCKOUT LAYOUT

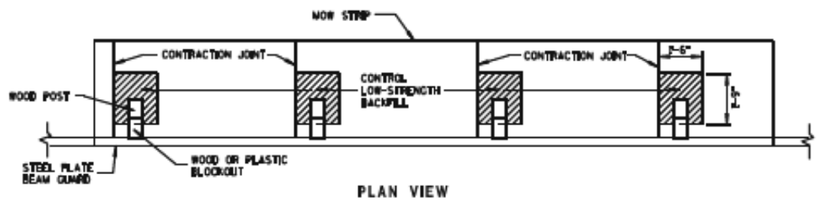


SECTION B-B



PLAN VIEW

MOW STRIP FOR TIGHT SPACING LAYOUT



PLAN VIEW

JOINT PLACEMENT FOR CONCRETE MOW STRIP

STEEL PLATE BEAM GUARD, CLASS "A" MOW STRIP DETAIL

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

APPROVED
7-13-09
DATE
/S/ Jerry M. Zogg
ROADWAY STANDARDS DEVELOPMENT ENGINEER
FHWA

6

6

S.D.D. 14 B 15-6d

S.D.D. 14 B 15-6d

6/24/2011
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DR.BY MSM	BOOK NO.	3	08/20/10	WDNR & COUNTY REVISIONS	6	06/24/11	WDNR REVISIONS	EAGLE SPRING LAKE MANAGEMENT DISTRICT KROLL DAM UPGRADES & SITE PLAN
CHK.BY KKA	JOB NO. 51-0166.00	2	07/12/10	WDNR REVISIONS	5	05/20/11	WDNR SUBMITTAL	AYRES ASSOCIATES Waukesha, Wisconsin
DATE MAR 2011	SCALE	1	05/18/10	PRELIMINARY CONCEPT	4	03/22/11	WAUKESHA COUNTY SUBMITTAL	KROLL DAM CONSTRUCTION DETAILS - BEAM GUARD
		NO.	DATE	REVISION	NO.	DATE	REVISION	DRAWING NO. C-10 SHEET NO.