

Technical Specifications

MRF Driveway Modifications
Outagamie County Northeast Landfill
Appleton, Wisconsin

Prepared for:

Outagamie County
Recycling & Solid Waste Department

SCS ENGINEERS

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SECTION 01 10 00 SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. References
2. Specification Formats and Conventions
3. Work Covered by the Contract Documents
4. Work Sequence
5. Use of Premises
6. Work By Others
7. Owner-Furnished Products
8. Partial Owner Occupancy

1.2 REFERENCES

A. Definitions

1. Basic Contract definitions and terminology are included in the General Conditions of the Contract.
2. The term "approved," when used to convey Engineer's action on Contractor's submittals, applications, and requests, is limited to Engineer's duties and responsibilities as stated in the General Conditions of the Contract.
3. The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

B. Industry Standards

1. Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
2. Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
3. If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.
4. The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements.

5. Each section of the Specifications generally includes a list of reference standards normally referred to in that respective section. The purpose of this list is to furnish the Contractor with a list of standards normally used for outlining the quality control desired on the project. The lists are not intended to be complete or all inclusive, but only a general reference of standards that are regularly referred to.
6. Each entity engaged in construction on the Project shall be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

1.3 SPECIFICATION FORMATS AND CONVENTIONS

- A. The Specifications are organized into Divisions and Sections using the 50-division format and CSI's "MasterFormat" numbering system.
- B. The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

1.4 WORK COVERED BY THE CONTRACT DOCUMENTS

- A. Project Identification
 1. Project Location: Outagamie County Landfill, Appleton, Wisconsin
 2. Owner: Outagamie County Recycling & Solid Waste Department
 3. Work will be performed under the following prime contracts:
 - a. MRF Driveway Modifications
- B. The Work includes:
 - 1 Mobilization and Demobilization
 - 2 Removal of Existing Curb & Gutter
 - 3 Removal of Existing Pavement and Subsoils
 - 4 Hydrant Relocation
 - 5 Initial Site Preparation & Grading
 - 6 Removal and Replacement of Unsuitable Materials
 - 7 Catch Basin #1 & RCP Piping to Existing Sanitary Sewer
 - 8 Catch Basin #2 Installation
 - 9 Catch Basin #3 Installation
 - 10 24" RCP Storm Sewer Installation
 - 11 15" RCP Storm Sewer Installation
 - 12 Furnish and Install Geotextile or Geogrid
 - 13 Load, Haul and Place Owner Supplied Crushed Concrete Base Course
 - 14 Furnish and Install 3 1/2" Crushed Rock
 - 15 Furnish and Install 1 1/4" Base Aggregate Dense
 - 16 Restoration

Note: All Work must be coordinated with the operations of the landfill and scheduled to prevent any disruption to daily operations.

1.5 WORK SEQUENCE

A. Perform Work in the following general sequence:

1. Locate utilities.
2. Prepare construction area, strip vegetation.
3. Relocate existing hydrant.
4. Remove existing pavement and subsoils.
5. Grade to design elevation.
6. Install storm sewer and catch basins.
7. Install crushed concrete layer.
8. Install 1 1/4" base aggregate dense layer.
9. Restoration.

1.6 USE OF PREMISES

- A. Contractor shall have full use of the premises for construction operations, including use of the Project Site, as allowed by law, ordinances, permits, easement agreements, and the Contract Documents.
- B. Assume full responsibility for protection and safekeeping of material and products stored on or off premises.
- C. Move any stored material or products which interfere with operations of Owner or other Contractors.
- D. Obtain and pay for use of additional storage or Work areas needed for operation.
- E. Use of Site
 - 1. Owner is responsible for providing access for vehicles hauling materials to/from the MRF. Contractor will have to share roadway during construction. Contractor shall not block or disrupt hauling activities. Coordinate with MRF personnel to avoid conflicts or delays.
 - 2. On-site Work shall be limited to between the hours of sunrise to sunset Monday through Saturday. Work on Sundays shall not be allowed unless approved in writing by Owner.
 - 3. Owner shall provide contractor two keys to the landfill gate. Keys shall not be duplicated, and shall be returned to Owner at completion of the Work. Contractor shall be responsible for locking gate if leaving after 3:30 p.m.

1.7 WORK BY OTHERS

- A. Owner will provide quality assurance testing as defined in the Specifications.

1.8 OWNER-FURNISHED PRODUCTS

- A. Products furnished by Owner and installed by Contractor:
 - 1. On-site soils used for grading and topsoil.

1.9 PARTIAL OWNER OCCUPANCY

A. Contractor provide:

1. Access for Owner's personnel.
2. Prior to occupancy, execute Certificate of Substantial Completion for designated areas.
3. Access for Engineer to perform all necessary inspections.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 22 04
MEASUREMENT AND PAYMENT
MRF DRIVEWAY MODIFICATIONS
(BID SCHEDULE "1")

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

Bid Item Description	Bid Item I.D.
Mobilization and Demobilization	1
Removal of Existing Curb & Gutter	2
Removal of Existing Pavement and Subsoils	3
Hydrant Relocation	4
Initial Site Preparation & Grading	5
Removal and Replacement of Unsuitable Materials	6
Catch Basin #1 & RCP Piping to Existing Sanitary Sewer	7
Catch Basin #2 Installation	8
Catch Basin #3 Installation	9
24" RCP Storm Sewer Installation	10
15" RCP Storm Sewer Installation	11
Furnish and Install Geotextile or Geogrid	12
Load, Haul and Place Owner Supplied Crushed Concrete Base Course	13
Furnish and Install 3" Base Aggregate Dense	14
Furnish and Install 1 1/4" Base Aggregate Dense	15
Restoration	16

B. Unit Prices include:

1. Defined Work for each Unit Price Item which will provide a functionally complete Project when combined with all Unit Price Items. If there are specific Work items which the Contractor believes are not identified in any Unit Price Item, but is required to provide a functionally complete Project, then the identified specific Work items shall be included in the appropriate Unit Price Item.
2. The method of measurement for payment.
3. The price per unit for payment.

C. Lump sum prices include:

1. All Work items which will result in a functionally complete project in accordance with the Specifications and Drawings.

1.2 GENERAL WORK ITEMS

- A. Include with the appropriate Bid Item the following Work items which are common to the Bid Items for this Section.

- B. If there is a specific Bid Item for any of the following items, then the Work item shall be included with that specific unit price item.
1. Mobilization and demobilization of equipment and personnel.
 2. All required bonds and insurance.
 3. Location and protection of all site monitoring devices and control monuments.
 4. Maintenance, protection, replacement and/or repair of damaged facilities outside the area identified for payment in a separate Unit Price Item.
 5. Site access requirements including temporary soil material as required for the Contractor to access the Work and his equipment.
 6. Dust control including watering of grades and haul roads.
 7. Traffic control.
 8. Erosion control construction.
 9. Right-of-way requirements.
 10. Regulatory requirements.
 11. Construction staking and other survey work not provided by Owner's representative.
 12. Location of existing utilities and piping.
 13. Protection of existing underground piping and utilities.
 14. Quality assurance and quality control testing and inspections not provided by the Owner's representative.
 15. Shop Drawings and other submittals.
 16. All costs for compliance with health and safety requirements.

1.3 MOBILIZATION AND DEMOBILIZATION (BID ITEM 1)

- A. The unit price for Bid Item 1 Work includes:
1. General Work Items of Article 1.2.
 2. All costs associated with the mobilization and demobilization of equipment and personnel.
 3. Furnish and install all necessary field offices for contractor and engineer including installation of temporary utilities.
 4. All utility costs for contractor installed facilities during construction.
- B. Measurement for payment will not be made.
- C. The unit of measurement for payment is lump sum.

1.4 REMOVAL OF EXISTING CURB & GUTTER (BID ITEM 2)

- A. The unit price for Bid Item 2 includes:
1. General Work items of Article 1.2.
 2. Remove existing curb and gutter.
 3. Haul and place in on-site debris management area.
- B. Measurement for payment will not be made.
- C. The unit of measurement for payment is lump sum.

1.5 REMOVAL OF EXISTING PAVEMENT AND SUBSOILS (BID ITEM 3)

- A. The unit price for Bid Item 3 includes:
1. General Work items of Article 1.2.
 2. Saw cut and remove existing pavement and subsoils to design subgrade elevation.

3. Haul and place in debris management area.
 4. Construction staking.
- B. Measurement for payment will be based on the actual plan view area of material removed measured by a field survey of the outside limits, excluding the area included in Bid Item 5. Only areas pre-approved for removal by Owner will be included in the quantity.
- C. The unit of measurement for payment is square feet.

1.6 HYDRANT RELOCATION (BID ITEM 4)

- A. The unit price for Bid Item 4 includes:
1. General Work items of Article 1.2.
 2. Saw cut and remove existing pavement along realignment corridor.
 3. Haul and place excess material in debris management area.
 4. Remove existing hydrant and valve.
 5. Confirm pipe size and type.
 6. Furnish and install ductile iron water pipe to new location.
 7. Furnish and install all necessary fittings.
 8. Re-install hydrant and valve.
 9. Pressure testing of the pipe.
 10. Bacteria testing of water.
 11. Furnish, install and compact backfill.
 12. Survey documentation of completed installation.
- B. Measurement for payment will not be made.
- C. The unit of measurement for payment is lump sum.

1.7 INITIAL SITE PREPARATION AND GRADING (BID ITEM 5)

- A. The unit price for Bid Item 5 Work includes:
1. General Work Items of Article 1.2.
 2. Clearing and grubbing construction area.
 3. Stripping and stockpiling topsoil.
 4. Remove existing fence.
 5. Removal and disposal (on-site) of existing culverts in grading area.
 6. Cut and fill to design subbase grades.
 7. Hauling and stockpiling excess material west of East Landfill.
 8. Proof rolling.
 9. Construction staking.
- B. Measurement for payment will not be made.
- C. The unit of measurement for payment is lump sum.

1.8 REMOVAL AND REPLACEMENT OF UNSUITABLE MATERIALS (BID ITEM 6)

- A. The unit price for Bid Item 6 Work includes:
1. General Work Items of Article 1.2.
 2. Removal and stockpiling (west of East Landfill) unsuitable soils.
 3. Load, haul, place and compact Owner supplied crushed concrete.
 4. Proof rolling.
 5. Construction staking.

- B. Measurement for payment will be based on cubic yards based on truck volumes.
- C. The unit of measurement for payment is cubic yard.

1.9 CATCH BASIN #1 & RCP PIPING TO EXISTING SANITARY SEWER (BID ITEM 7)

- A. The unit price for Bid Item 7 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Shop Drawings.
 - 3. Excavation to design grades.
 - 4. Dewatering if necessary.
 - 5. Locate and expose existing sanitary sewer at connection locations.
 - 6. Core opening in existing storm sewer.
 - 7. Furnish and install bedding.
 - 8. Furnish and install 12" RCP.
 - 9. Furnish and install catch basin,
 - 10. Place and compact backfill.
 - 11. Construction staking.
- B. Measurement for payment will not be made.
- C. The unit of measurement for payment is lump sum.

1.10 CATCH BASIN #2 INSTALLATION (BID ITEM 8)

- A. The unit price for Bid Item 8 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Shop Drawings.
 - 3. Excavation to design grades.
 - 4. Dewatering if necessary.
 - 5. Locate and expose existing sanitary sewer at connection locations.
 - 6. Furnish and install bedding.
 - 7. Furnish and install catch basin,
 - 8. Place and compact backfill.
 - 9. Construction staking.
- B. Measurement for payment will not be made.
- C. The unit of measurement for payment is lump sum.

1.11 CATCH BASIN #3 INSTALLATION (BID ITEM 9)

- A. The unit price for Bid Item 9 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Shop Drawings.
 - 3. Excavation to design grades.
 - 4. Dewatering if necessary.
 - 5. Locate and expose existing sanitary sewer at connection locations.
 - 6. Furnish and install bedding.
 - 7. Furnish and install catch basin,
 - 8. Place and compact backfill.
 - 9. Construction staking.

- B. Measurement for payment will not be made.
- C. The unit of measurement for payment is lump sum.

1.12 24" RCP STORM SEWER INSTALLATION (BID ITEM 10)

- A. The unit price for Bid Item 10 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Furnish and install pipe.
 - 3. Furnish and install bedding material.
 - 4. Furnish and install all necessary fittings.
 - 5. Coordination of Work with landfill personnel.
 - 6. Construction staking.
 - 7. Survey documentation of installed pipe at a 25' interval.
- B. Measurement for payment will be based on the actual length of pipe installed as measured by survey. Measurement will be from each end of installed horizontal pipe beginning and ending where it enters a structure or tie-in to existing pipe.
- C. The unit of measurement for payment is linear feet.

1.13 15" RCP STORM SEWER INSTALLATION (BID ITEM 11)

- A. The unit price for Bid Item 11 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Furnish and install pipe.
 - 3. Furnish and install bedding material.
 - 4. Furnish and install all necessary fittings.
 - 5. Coordination of Work with landfill personnel.
 - 6. Construction staking.
 - 7. Survey documentation of installed pipe at a 25' interval.
- B. Measurement for payment will be based on the actual length of pipe installed as measured by survey. Measurement will be from each end of installed horizontal pipe beginning and ending where it enters a structure or tie-in to existing pipe.
- C. The unit of measurement for payment is linear feet.

1.14 FURNISH AND INSTALL GEOTEXTILE OR GEOGRID (BID ITEM 12)

- A. The unit price for Bid Item 12 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Preparation and proof rolling of subsurface.
 - 3. Furnish and install material
 - 4. Construction staking.

- B. Measurement for payment will be based on the actual plan view area of material placed measured by a field survey of the outside limits.
 - C. The unit of measurement for payment is square feet.
- 1.15 LOAD, HAUL, AND PLACE OWNER SUPPLIED CRUSHED CONCRETE BASE COURSE (BID ITEM 13)
- A. The unit price for Bid Item 13 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Preparation of subsurface.
 - 3. Source testing of material.
 - 4. Load, haul, place and compact material.
 - 5. Proof rolling.
 - 6. Fine grading.
 - 7. Construction staking.
 - B. Measurement for payment will be based on the actual plan view area of material placed measured by a field survey of the outside limits.
 - C. The unit of measurement for payment is square feet.
- 1.16 FURNISH AND INSTALL 3" BASE AGGREGATE DENSE (BID ITEM 14)
- A. The unit price for Bid Item 14 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Preparation of subsurface.
 - 3. Source testing of material
 - 4. Furnish, place and compact material
 - 5. Proof rolling.
 - 6. Fine grading
 - 7. Construction staking.
 - B. Measurement for payment will be based on the number of tons of material delivered and installed based on scale tickets provided by the supplier.
 - C. The unit of measurement for payment is per ton.
- 1.17 FURNISH AND INSTALL 1 ¼" BASE AGGREGATE DENSE (BID ITEM 15)
- A. The unit price for Bid Item 15 Work includes:
 - 1. General Work Items of Article 1.2.
 - 2. Preparation of subsurface.
 - 3. Source testing of material
 - 4. Furnish, place and compact material
 - 5. Proof rolling.
 - 6. Fine grading
 - 7. Construction staking.

- B. Measurement for payment will be based on the number of tons of material delivered and installed based on scale tickets provided by the supplier.
- C. The unit of measurement for payment is per ton.

1.18 RESTORATION (BID ITEM 16)

- A. The unit price for Bid Item 16 includes:
 - 1. General Work Items of Article 1.2.
 - 2. General site cleanup.
 - 3. Removal of all tools, equipment and debris.
 - 4. Removal of silt fencing and temporary erosion controls.
 - 5. Removal of all unused materials unless Owner approves leaving on site.
 - 6. Topsoil, seed, fertilize, and mulch all previously grassed areas disturbed by construction.
- B. Measurement for payment will be not be made.
- C. The unit of measurement for payment is lump sum.

END OF SECTION

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for submittals:
1. Electronic Submittal
 2. Progress Schedule
 3. Submittal Procedures
 4. Schedule of Shop Drawings and Sample Submittals
 5. Shop Drawings
 6. Samples
 7. Quality Assurance and Quality Control Submittals
- B. Prepare and submit to the Owner within 10 days after the Effective Date of the Agreement, an electronic copy in a portable document format (PDF) of the preliminary Progress Schedule of the Work activities from Notice to Proceed until Substantial Completion and Submittal Schedule.

At least 10 before submission of the first Application for Payment a conference attended by Contractor, Owner, and others as appropriate will be held to review the preliminary schedules for acceptability to Owner. Contractor shall have an additional 10 days to make corrections and resubmit.

Failure to meet Submittal requirements to the satisfaction of the Owner will constitute unsatisfactory performance of the Work in accordance with the Contract Documents, therefore, the Owner may withhold all or a portion of payments requested during the corresponding pay period until these requirements are met.

1.2 ELECTRONIC SUBMITTAL

- A. Prepare and submit in PDF format. Follow the general submittal requirements outlined below.

1.3 PROGRESS SCHEDULE

- A. Prepare and submit to the Owner within 10 days after the Effective Date of the Agreement, an electronic copy in a PDF of the preliminary progress schedule of the Work activities from Notice to Proceed until Substantial Completion.
1. Provide sufficient detail of the Work activities comprising the schedule to assure adequate planning and execution of the Work, such that in the judgement of the Owner, it provides an appropriate basis for monitoring and evaluation of the progress of the Work. A Work activity is defined as an activity which requires substantial time and resources (manpower, equipment, and/or material) to complete and must be performed before the Contract is considered complete.
 2. The schedule shall indicate the sequence of Work activities. Identify each activity with a description, start date, completion date, and duration. Include, but do not limit to the following items, as appropriate to this Contract:
 - a. Shop Drawing review by the Owner.
 - b. Material and Equipment:

- 1) Order.
- 2) Manufacture.
- 3) Delivery.
- 4) Installation.
- 5) Startup.
- 6) Operation and maintenance training.
- c. Performance tests and supervisory service activities.
- d. Excavation and grading.
- e. Concrete placement sequence.
- f. Construction of various facilities.
- g. Construction of various segments of utilities.
- h. Subcontractor's items of Work.
- i. Allowance for inclement weather.
- j. Contract interfaces, date of Substantial Completion.
- k. Interfacing and sequencing with existing facilities and utilities.
- l. Sequencing of major construction activities.
- m. Milestones and completion dates.

B. Distribution

Following response to the initial submittal, distribute electronic PDF copies of the revised construction schedule to the Owner, Subcontractors, and other parties required to comply with scheduled dates. Post paper copies in the field office.

- 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

C. Schedule Updating

Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

D. Punch List

Prepare and submit to the Owner within 10 days after substantial completion a detailed progress schedule for outstanding Work and punch list items.

1.4 SUBMITTAL PROCEDURES

A. Coordination

Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

- 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
- 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

3. To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
 - a. Allow 2 weeks for initial submittal.
 - b. Allow 2 weeks for reprocessing each submittal.
 - c. No extension of Contract Time will be authorized because of failure to transmit submittals to the Owner sufficiently in advance of the Work to permit processing.

B. Submittal Preparation

1. Prepare and submit via email to Owner's Representative.
2. Each submittal shall be reviewed by the Contractor for conformance with the Contract Documents. The Owner will not review submittals which have not been reviewed and approved by the Contractor.

C. Submittal Transmittal

Prepare and submit via email to Owner's Representative. The Owner's Representative will not accept submittals received from sources other than the Contractor. Each submittal shall clearly indicate what portion of the Work it applies to and what options, sizes, materials types, etc. are proposed.

1.5 SCHEDULE OF SHOP DRAWINGS AND SAMPLE SUBMITTALS

A. Submit an electronic copy of the preliminary submittal schedule as follows:

1. Coordinate submittal schedule with the subcontractors, Schedule of Values, and the list of products as well as the Contractor's Progress Schedule.
2. Prepare the schedule in chronological order. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number.
 - c. Submittal category (Shop Drawings, Product Data, or Samples).
 - d. Name of the subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for the Owner's final release or approval.

B. Distribution

Following response to the preliminary submittal schedule, print and distribute copies of the revised submittal schedule to the Owner, Subcontractors, and other parties required to comply with submittal dates indicated. Post paper copies in the field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

C. Schedule Updating

Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.6 SHOP DRAWINGS

- A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract

Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

- B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates, and similar Drawings. Include the following information:

1. Dimensions.
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit electronic Shop Drawings to print on sheets at least 8½ by 11 inches (215 by 280 mm) but no larger than 24 by 36 inches (610 by 915 mm).

- C. Collect product data into a single submittal for each element of construction or system. Product data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show actual product to be provided. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.

- D. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

- E. Submittals

Submit in a PDF format or a previously approved alternative.

- F. Distribution

Furnish PDF copies of reviewed submittal to installers, Subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms. Maintain one paper copy at the project site for reference.

1. Do not proceed with installation until a copy of the Shop Drawing is in the Installer's possession.
2. Do not permit use of unmarked copies of the Shop Drawing in connection with construction.

1.7 SAMPLES

- A. Submit representative samples upon request.

1.8 QUALITY ASSURANCE SUBMITTALS

- A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other sections of the Specifications.

B. Certifications

Where other sections of the Specifications require certification that a product, material, or installation complies with specified requirements submit a notarized certification from the manufacturer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports

Submit as required by other sections of the Specifications.

1.9 OWNER'S ACTION

- A. Except for submittals for the record or information, where action and return is required, the Owner will review each submittal, mark to indicate action taken, and return promptly. The Owner will complete the Submittal/Shop Drawing Review electronically indicating results of the review as follows:

1. "No Exceptions Taken": The Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents.
2. "Make Corrections Noted": The Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents.
3. "Amend and Resubmit": Do not proceed with Work covered by the submittal. Resubmit without delay. Do not use, or allow others to use, submittals marked "Amend and Resubmit" at the Project Site or elsewhere where Work is in progress.
4. "Rejected - See Remarks": Do not proceed with Work covered by the submittal. Resubmit without delay. Do not use, or allow others to use, submittals marked "Rejected and Resubmit" at the Project Site or elsewhere where Work is in progress.
5. "Not Subject to Review" – The Owner will return unsolicited submittals to the sender without action.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 71 23 FIELD ENGINEERING

PART 1 - GENERAL

1.1 DESCRIPTION OF THE WORK

A. Work under this section is associated with:

1. Staking
2. Documentation Surveys

1.2 STAKING OF THE WORK

A. Staking work to be provided by Owner.

1. Survey control monuments on the project site. Survey control monuments will be established by the Engineer.
2. Owner will perform documentation surveys for calculation of pay quantities.

B. Staking to be provided by Contractor.

1. Contractor shall set lines and grades necessary for the detailed execution of the Work. Design Drawings will be provided to Contractor in AutoCAD format.
2. Costs for construction staking necessary for the detailed execution of the Work shall be borne by the Contractor.

1.3 PROFILE AND TOPOGRAPHY

A. Contours or profiles of the ground are shown on the Drawings. These profiles and contours are reasonably correct, but are not guaranteed to be absolutely so, and together with any schedule of quantities are presented only as an approximation.

1.4 PROTECTION, RELOCATION, AND REPLACEMENT

- A. The Contractor shall protect and preserve all permanent and temporary reference points.
- B. The Contractor shall make no changes in grade, alignment, or location without written approval of the Owner.
- C. The Contractor shall report to the Engineer any reference point which is lost, destroyed, or requires relocation because of necessary changes in grades or location.
- D. The Contractor shall be responsible for the cost of relocating any stake or reference point lost as a result of his negligence during the construction period.

1.5 SITE DOCUMENTATION SURVEYS (BY OWNER)

A. Owner will perform the site documentation survey work necessary to determine whether Work is in compliance with required horizontal and vertical tolerances.

Contractor will be responsible for costs required for additional surveys required to re-document areas not in compliance with the Specifications.

- B. The Contractor shall provide safe access to the Engineer for collection of all necessary measurements both above and below ground.
- C. Items that are specified to be documented will not be considered complete until documented.

1.6 SITE DOCUMENTATION SURVEYS (BY CONTRACTOR)

- A. Perform documentation surveys of all installed piping at a minimum 25' interval and at all fitting locations. Location and top of pipe elevation shall be recorded. Perform documentation survey of installed structures. Provide data in a .csv format to Engineer within 1 week of survey.
- B. Contractor is responsible for all costs related costs to complete the surveys.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01 71 23

SECTION 31 22 00 GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section applies to the initial grading of the construction area.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM)
1. ASTM D698 Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb. (2.49-kg) Rammer and 12-in. (305-mm) Drop (Standard Proctor).
 2. D1556 Test for Density of Soil in Place by the Sand-Cone Method.
 3. D1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Lb (4.54 kg) Rammer and 18 in. (457 mm) Drop.
 4. D2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
 5. D6938-07 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Soil used for grading (if needed) shall consist of clay from on-site stockpile west of NELF.

2.2 GRADING EQUIPMENT

- A. Grading equipment used for final grading shall be equipped with GPS equipment to control the grade. Design information will be provided by the Owner on an Excel spreadsheet or other electronic format.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavation to Correct Grade
1. Excavate site as follows:
 - a. To general elevation and slope shown on the Drawings.
 2. Excavation of unsuitable materials.
 - a. Excavate unsuitable soil materials under a proposed structure or pavement area.
 - b. Notify the Owner's project representative prior to proceeding with the removal of unsuitable material.

B. Excavation Precautions

1. Excavation Slope Stability:
 - a. Maintain excavation slope to ensure a stable excavation and prevent caving.
 - b. Provide and erect all timber work, shoring, sheeting, bracing, etc. necessary to prevent caving and displacement of adjacent property.
 - 1) Shoring shall be placed so as not to interfere with building Work.
 - 2) Shoring shall be independent of footings.
2. Underpinning Existing Structures:
 - a. Underpin as necessary to protect existing structures and foundations.
 - b. Furnish all material, labor, and equipment necessary to complete underpinning operations.
3. Dewatering of Excavations:
 - a. Provide and maintain all equipment necessary to keep excavated areas free of all groundwater, surface water, or precipitation.
 - b. Soil which becomes soft, yielding, or loses support due to inadequate dewatering efforts shall be dealt with as follows:
 - 1) Excavate disturbed soil materials for their entire depth.
 - 2) Replace excavated materials with an approved fill material.
4. Protect Excavation from Freezing:
 - a. Take precautions necessary to prevent frost from entering subgrade soils.
 - b. If subgrade becomes frozen, remove snow, ice, and frozen soil prior to placement of additional fill or finish surfacings.

3.2 TEST ROLLING

- A. Test roll finished cut or fill subgrades by rolling with a heavy weight vibratory roller or a heavy weight loader rubber tire vehicle.
1. Method and equipment used shall be suitable for intended use.
 2. Take necessary precautions to protect existing structures from damage during test rolling.
 3. Test roll an area equal to the area of the proposed construction plus a minimum of 3 feet on each side.
 4. Rutting greater than 1" will be considered a failed test.
- B. Treat areas showing yielding or rutting (>1") under test rolling as follows:
1. Replace and/or recompact as necessary to stabilize the area.
 2. Retest soil areas replaced or recompact.

3.3 FILLING AND COMPACTING

- A. Layer thickness for fill soil shall be as follows:
1. Layer thickness shall be dependent on the soil classification type, weight, and soil contact pressure of compaction equipment being used.
 2. Layer thickness shall not exceed 12 inches.
- B. Compaction
1. Compaction method for fill soils shall be appropriate for soil material being compacted and provide sufficient soil contact pressure to thoroughly compact entire lift thickness.

- C. Proper soil moisture contents for compaction shall be maintained in all soils.
1. Optimum moisture content as determined by modified (ASTM D1557) or standard (ASTM D698) Proctor shall be used to determine acceptance moisture contents for soil compaction.
 2. Use the following guidelines to determine moisture content range for compaction of various soils:

Moisture Requirements for Compaction of Various Soils

Material Description	Soil Class	Tolerable Range of Moisture Content About Optimum (%)
Coarse grained, cohesionless soils with less than 4% P200 or with less than 8% uniform gradation (i.e., clean sand or gravel).	"A" and "B"	Highest practical moisture content (saturation may be required)
Sandy clays, silty clay silts, and clays	"E" and "G"	-4 to +6
All other soil types	All other soil classes.	-1 to +3

Note: The above requirements are general guidelines for soil moisture content which may or may not apply to a specific soil material. In some circumstances, the required density may be attained at moisture contents outside the ranges indicated above.

3. If soil material has excessive or deficient moisture, dry out or add moisture to the degree necessary for the required compaction. Determine moisture content in accordance with ASTM D2216.
- D. Compaction requirements for all fill soils unless specified elsewhere shall be as follows:
1. Class 1:
 - a. Fills supporting structures.
 - b. Subgrade under pavements or floors.
 - c. Backfill under piping and conduits.
 2. Class 2:
 - a. Fills which do not support structures.
 - b. Embankments, dikes, or berms.

Compaction Requirements for Various Soil Classes

Soil Class	Required Compaction (%) of modified Proctor Density	
	Class 1	Class 2
A, B, C, D, E, and G	90	90

- E. Soil classes not requiring compaction by the above schedule will be proof rolled when requested by the Owner's Representative.
- F. Density testing will be performed at the discretion of the Engineer. Contractor shall prepare test locations.

- G. Recompact any areas not meeting density requirements.

3.4 BACKFILLING AROUND STRUCTURES

- A. Do not backfill any foundation, wall, or structure prior to inspection by the Engineer.

3.5 DISPOSAL OF SURPLUS MATERIALS

- A. Haul and dispose of all surplus materials to Debris Management Area west of the East Landfill.
- B. Surplus materials shall be hauled and placed in the appropriate stockpile locations.

3.6 FINISH GRADING

- A. Grade, trim, and shape subgrade to required grade and section.
 - 1. Adjust slopes by grading so that transition is smooth and gradual.
 - 2. The crests of cut banks shall be rounded and shaped.
 - 3. Refill, regrade and compact washouts and ruts.
 - 4. Remove all stones 12 inches or larger from grading limits.
- B. Vertical Grading Tolerances
 - 1. -0.1 feet to +0.1 feet.
 - 2. Positive drainage at all locations.

END OF SECTION

SECTION 31 22 30 SITE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Preparation.
- B. Existing Utilities.
- C. Temporary erosion- and sedimentation-control measures.
- D. Removing existing vegetation.
- E. Clearing and grubbing.
- F. Stripping and stockpiling topsoil.
- G. Temporary erosion- and sedimentation-control measures.

1.2 PROJECT CONDITIONS

- A. Traffic: Minimize interference with plant operations, adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct access road to site without permission from Owner and coordination with other site contractors.
 - 2. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 3. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
 - 4. Provide traffic control as required.
- B. Do not commence ground disturbing construction activities until temporary erosion- and sedimentation-control measures are in place.

1.3 REFERENCES

- A. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications, most recent edition.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. Identify existing benchmarks that will interfere with construction to the Owner. Owner will relocate existing benchmarks outside of the Work limits.
- B. Protect existing site improvements to remain from damage during construction.
 - 1. Avoid damaging improvements identified by Owner to remain intact.

2. Restore damaged improvements to their original condition, as acceptable to Owner.
- C. Protect existing site wells within or adjacent to construction activities.

3.2 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 1. Arrange with utility companies to shut off indicated utilities.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated: Revise subparagraphs below to suit Project. Revise subparagraphs below to suit Project.
 1. Notify Company not less than 7 days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Company's written permission.
- C. Provide all coordination with Owner of gas distribution pipeline for activities within the easement limits. Comply with all pipeline Owner requirements for work within the easement.

3.3 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 1. Remove stumps and roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 2. Remove unsuitable soils as necessary.
 3. Dispose of wood waste on site in Debris Management Area.

3.4 TOPSOIL STRIPPING

- A. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.
- B. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Maintain to prevent windblown dust and erosion by water.

3.5 FENCE REMOVAL

- A. Remove existing fence as needed to perform Work.

END OF SECTION

SECTION 31 32 19 GEOTEXTILES AND GEOGRIDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Geotextile fabrics under rip-rap (Type HR and C).
2. Geotextile fabrics for roadway and structure subgrade reinforcement (Type D).
3. Geotextile fabrics used for protection or cushioning (Type E).
4. Geogrid for pavement subgrade reinforcement.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D123 Standard Terminology Relating to Textiles.
2. ASTM D3786 Standard Test Method for Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method.
3. ASTM D4354 Standard Practice for Sampling Geosynthetics and Rolled Erosion Control Products for Testing.
4. ASTM D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xeon-Arc Type Apparatus.
5. ASTM D4491 Standard Test Method for Water Permeability of Geotextiles by Permittivity.
6. ASTM D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
7. ASTM D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
8. ASTM D4751 Standard Test Method for Determining Apparent Opening Size of a Geotextile.
9. ASTM D4873 Standard Guide for Identification, Storage and Handling of Geosynthetic Rolls and Samples.
10. ASTM D4884 Standard Test Method of Strength of Sewn or Bonded Seams of Geotextiles.
11. ASTM D6241 Standard Test Method for Measuring Static Puncture Strength of Geotextiles and Geosynthetic Related Products Using a 50 mm Probe.
12. ASTM D6637 Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.
13. ASTM D7748 Standard Test Method for Flexural Rigidity of Geogrids, Geotextiles and Related Products.

B. Geosynthetics Institute (GRI):

1. GT12(a) Test Methods and Properties for Nonwoven Geotextiles Used as Protection (or cushioning) Materials – ASTM Version.
2. GT13(a) Test Methods and Properties for Geotextiles Used as Separation Between Subgrade Soils and Aggregate – ASTM Version.

1.3 SUBMITTALS

- A. Provide, prior to delivery of the geotextile fabric or geogrid, a manufacturer's Certificate of Compliance that the geotextile fabric or geogrid meets the requirements of this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver only geotextiles and geogrid meeting the specifications to the Site.
- B. All geotextiles and geogrid shall be labeled, shipped, stored, and handled in accordance with ASTM D4873.
- C. Do not use hooks, tongs or other sharp instruments for handling geotextile and geogrid.
- D. Store geotextile fabric and geogrid in a dry location until installed.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide geotextile fabric consisting of either woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride.
 - 1. All fabric shall have the minimum strength values in the weakest principle direction.
 - 2. Non-woven fabric may be needle punched, heat bonded, resin bonded or combinations thereof.
- B. Provide geogrid consisting of a single layer of a uniform square grid of bonded, formed, or fused polymer tensile strands.
 - 1. Provide geogrid consisting of polyester, polypropylene, polyamide, or polyethylene material that maintains dimensional stability during handling, placing, and installation.
 - 2. Provide geogrid with a minimum width of 6 feet.
- C. The geotextile fabric and geogrid shall be insect, rodent, mildew and rot resistant.
- D. Clearly mark the geotextile fabric and geogrid rolls showing the type of fabric.
- E. If sewn geotextile seams are used, provide a field sewn seam sample produced from the geotextile fabric and thread and with the equipment to be used on the project, prior to its incorporation into the Work.
- F. Provide pins, staples, or other devices approved by Manufacturer and Engineer to secure geogrid during placement. Provide ties, straps, clips, or other devices approved by Manufacturer and Engineer to lap geogrid sections together.

2.2 MATERIALS

- A. Nonwoven Geotextile Fabric, Type HR
 - 1. Type HR non-woven geotextile fabric shall be used beneath medium (greater than 400 lb stones) and heavy (greater than 650 lb stone) riprap.

2. The fabric shall comply with the following physical properties:

Test	Method	Value ⁽¹⁾
Grab Tensile Strength (lbs)	ASTM D4632	305 min.
Puncture Strength (lbs)	ASTM D6241	500 min.
Grab Elongation (%)	ASTM D4632	15 min.
Permittivity, sec ⁻¹	ASTM D4491	0.30 min.

⁽¹⁾All numerical values represent minimum/maximum average roll values (i.e., the average of minimum test results on any roll in a lot should meet or exceed the minimum specified values).

3. The following fabrics are approved for Type HR:

- a. Amoco (Nilex) – 4512
- b. Carthage – FX-160HS
- c. Contech – C120NW
- d. Mirafi – 1120N

B. Nonwoven Geotextile Fabric, Type C

1. Type C nonwoven geotextile fabric shall be used beneath light riprap (less than 400 lb stone).
2. The fabric shall comply with the following special physical properties.

Test	Method	Value ⁽¹⁾
Grab Tensile Strength (lbs)	ASTM D4632	205 min.
Puncture Strength (lbs)	ASTM D6241	350 min.
Apparent Opening Size (U.S. Standard Sieve)	ASTM D4751	40-140.
Permittivity, sec ⁻¹	ASTM D4491	0.10 min.

⁽¹⁾All numerical values represent minimum/maximum average roll values (i.e., the average of minimum test results on any roll in a lot should meet or exceed the minimum specified values).

3. The following non-woven fabrics are approved for Type C:

- a. Amoco (Nilex) – 4553
- b. Carthage – FX-80HS
- c. Contech – C-200
- d. Mirafi – 180N

C. Woven Geotextile Fabric Subgrade Reinforcement, Type D

1. Woven geotextile fabric subgrade reinforcement shall be used beneath roadway subbase and structures to reinforce existing subgrade soils.
2. Ground stabilization fabrics shall consist of woven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride with the following requirements. Woven fabric shall have the minimum strength values in the weakest principle direction.

3. The fabric shall comply with the following minimum physical requirements:

Parameter	Method	Value ⁽¹⁾
Trapezoid Tear (lbs)	ASTM D4533	100 lbs
Permittivity (sec-1)	ASTM D4491	0.02
Apparent Opening Size (sieve size)	ASTM D4751	30/70
Ultraviolet Degradation (% strength retained)	ASTM D4355	70
Grab Tensile Strength (lbs)	ASTM D4632	280 min.
Puncture Strength (lbs)	ASTM D6241	700 min.
Mullen Burst (psi)	ASTM D3786	600 min.
Elongation at Required Strength (%)	ASTM D4632	25% max.

⁽¹⁾All numerical values represent minimum/maximum average roll values (i.e., the average of test results on any roll in a lot should meet or exceed the minimum values in the table).

4. The fabric shall be insect, rodent, mildew and rot resistant.

5. The following woven fabrics are approved for Type D:

- a. Amoco (Nilex) – 2006
- b. Carthage – FX66
- c. Contech – C300
- d. LINQ (Tytar) – GTF300
- e. Mirafi – 600X
- f. Ten Cate Nicolon – Geolon HP370
- g. Webtech – Terra Tex HD

- D. Nonwoven geotextile fabrics used for protection (or cushioning), Type E.

1. Nonwoven geotextiles used for cushioning shall be placed between membranes and soils.
2. Nonwoven geotextiles used for cushioning shall conform to GRI-GT12a.
3. The geotextile fabric shall comply with the physical properties in Table 1.

Table 1

Property ⁽¹⁾	Test Method ASTM	Unit	Mass/Unit Area (oz/yd ²)
Mass per unit area	D5261	oz/yd ²	12
Grab tensile strength	D4632	lb	300
Grab tensile elongation	D4632	%	50
Trap. Tear strength	D4533	lb	115
Puncture (CBR) strength	D6241	lb	800
UV resistance ⁽²⁾	D4355	%	70

⁽¹⁾ All values are MARV except UV resistance; it is a minimum value.

⁽²⁾ Evaluation to be on 2.0 inch strip tensile specimens after 500 hours exposure.

E. Geogrid for pavement subgrade reinforcement:

1. Provide geogrid that meets the following physical properties:

Property	Test Method	Value ⁽¹⁾
Tensile Strength at 5% Strain (both principal directions) (lb/ft)	ASTM D6637	500 min.
Overall Flexural Rigidity (mg-cm_	ASTM D7748	250,000 min.
Aperture Area (square inches)	Inside Measurement	5.0 max.
Aperture Dimension (inches)	Inside Measurement	0.5 min.

(1) Numerical values represent minimum/maximum average roll values. Average test results from each roll in a lot must conform to the tabulated values.

PART 3 - EXECUTION

3.1 SEAMS (TYPE E)

- A. Sew the seams of the geotextile with thread having the same or greater physical properties as the material. Thread shall have similar or better resistance to chemical attack and UV degradation as the geotextile material.
- B. Test seams in accordance with ASTM D4884.
- C. Seams shall develop a tensile strength equal to or greater than 90 percent of the required grab tensile strength of the fabric, unless otherwise specified.
- D. Seam shall be a prayer type. Provide a minimum of 1 test result from a trial seam performed at site.

3.2 SEAMS (TYPE HR AND TYPE C)

- A. Grade the area smooth and remove all stones, roots, sticks or other foreign material which would interfere with the fabric being completely in contact with the soil.
- B. Place the fabric loosely and parallel to the direction of water movement.
 - 1. Provide pinning or stapling to hold the geotextile in place.
 - 2. Join separate pieces of fabric by overlapping or sewing according to Table 3.

Table 3. Maximum Spacing for Securing Pins

Slope	Spacing (feet)
Steeper than 3H to 1V	2
From 3H to 1V to 4H to 1V	3
Flatter than 4H to 1V	5

- 3. Place the fabric in the overlapped joints with a minimum overlap of 24 inches in the direction of flow.

- C. After placement, do not expose the fabric longer than 48 hours prior to covering.
- D. Cover damaged areas with a patch of fabric using a 3-foot overlap in all directions.
- E. Place riprap from the base of the slope upward.
- F. Do not allow freefall of riprap to prevent damage to the fabric.

3.3 SEAMS (TYPE D)

- A. Prior to the placement of geotextile fabric, grade smoothed and shaped to the required grade and section. After the fabric has been placed, do not permit traffic or construction equipment to travel directly on the fabric.
- B. Roll out the fabric on the excavation and pull taut manually to remove wrinkles.
 - 1. Join separate pieces of fabric by overlapping or sewing as required by the Engineer.
 - 2. Place the fabric in the overlapped joints with a minimum overlap of 18 inches.
 - 3. Provide weights or other methods to prevent lifting of the fabric by wind.

3.4 PROTECTION

- A. Protect the geotextile and geogrid at all times during construction from contamination by surface runoff. Remove and replace any geotextile or geogrid so contaminated with uncontaminated material.
- B. Replace any damaged geotextile or geogrid.
- C. Schedule the work so that the covering of the geotextile or geogrid with a layer of the specified material is completed within 20 calendar days after placement of the geotextile or geogrid.
- D. Protect the geotextile and geogrid from damage prior to and during the placement of riprap or other materials.
 - 1. Limit the height of drop to less than 300 mm (1 foot), or place a cushioning layer of sand or gravel on top of the geotextile or geogrid before placing the material, or other methods deemed necessary.
 - 2. Take care to ensure that the utilized cushioning materials do not impede the flow of water.
 - 3. Before placement of riprap or other materials, demonstrate that the proposed placement technique will not cause damage to the geotextile or geogrid.

3.5 PLACEMENT OF CUSHIONING MATERIAL (TYPE E)

- A. Place geotextile panels perpendicular to slope. Avoid cross seams on slopes greater than 10 percent.
- B. Place cushioning material in a manner to insure intimate contact of the geotextile with the prepared surface and with the cushioning material.
- C. Place the cushioning material in a manner that does not damage the geotextile including tear, puncture, or abrasion. In no cases will equipment travel be allowed directly on in-place unprotected geomembrane/geotextile.
- D. Uncontrolled deployment of geotextile rolls will not be allowed.
- E. During placement, the height of the drop of material shall not be greater than 12 inches.

- F. Replace any geomembrane damaged beneath the cushioning material.

3.6 PLACEMENT OF GEOGRID

- A. Smooth and shape subgrade surface to eliminate rocks, clods, roots, or other debris that may damage geogrid during placement or backfilling.
- B. Pull geogrid flat during placement and secure with approved pins, staples, or other devices to prevent displacement. Lap butt joints between roll ends at least 12 inches. Overlap parallel strips at least 6 inches. Secure lapped sections with approved ties, straps, clips, or other devices.
- C. Do not operate vehicles or construction equipment directly on geogrid.
- D. Cover small rips, tears, or defects in geogrid with an additional section of geogrid secured in place overlapping damaged area by at least 3 feet in each direction. Remove and replace geogrid sections with large rips, tears, defects, or other damage as directed by Engineer or Owner before backfilling.
- E. Use an initial backfill lift thickness over geogrid of at least 4 inches.

END OF SECTION

SECTION 32 11 23 BASE AGGREGATE DENSE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Materials testing.
 - 2. Crushed aggregate base course for roads, shoulders, and parking areas.
 - 3. Adjustment of utility accesses.

1.2 REFERENCES

- A. State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction, current edition, (herein referred to as WisDOT), and all supplemental and interim supplemental specifications, as they may pertain.
- B. State of Wisconsin Department of Transportation Construction and Materials Manual (CMM).

1.3 SUBMITTALS

- A. Submit two (2) copies of the results of the source quality control testing (include location where test was done):
 - 1. Materials source testing.
 - a. Aggregate supplied from a previously approved source provide source testing report and approval letter from Owner the material was supplied.
 - 2. Crushed aggregate base material installation testing.
 - 3. Additional density and gradation testing, if required.
- B. Submit daily one copy of weight tickets showing the net weight for each truckload of crushed aggregate base material delivered and placed.

1.4 QUALITY ASSURANCE

Base aggregate dense

- A. Field quality control testing will be performed by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregates shall conform to WisDOT Section 305.
- B. Conform to State of Wisconsin Department of Transportation Construction and Materials Manual (CMM).
- C. Only acceptable material is crushed limestone, crushed concrete is not allowed.
- D. Aggregate Gradation Requirements
 - 1. Gradation $\frac{3}{4}$ inch material for shoulders – WisDOT Section 305.
 - 2. Gradation 1 $\frac{1}{4}$ inch material – WisDOT Section 305.
 - 3. Gradation 3 inch material – WisDOT Section 305

2.2 SOURCE QUALITY CONTROL

- A. Test for source quality control testing shall be in accordance with WisDOT Standard Specifications for Highway and Structure Construction Section 305. Contractor shall provide testing and documentation for the source quality control requirements. Provide a minimum of 1 representative modified Proctor test for each material type.
- B. Test aggregate material per the Construction Materials Manual.
- C. Provide additional Source Quality Control Density and Gradation Testing when:
 - 1. Aggregate density does not meet project requirements.
 - 2. There is a change in method of compaction.
 - 3. There is a change in source or quality of aggregate.

PART 3 - EXECUTION

3.1 GENERAL

- A. All work shall be done in accordance with WisDOT Sections 209 and 305.
- B. One lift of Crushed Aggregate Base Course must be placed on subbase course and aggregate backfill at end of each working day.
- C. Dust Abatement
 - 1. Minimize the dispersion of dust from the base course by the application of water or other approved dust control materials.

3.2 FIELD QUALITY CONTROL

- A. Installation Testing in accordance with the Construction Materials Manual.
- B. Provide additional Density and Gradation Testing in accordance with the Construction Materials Manual.

END OF SECTION

SECTION 33 00 01

CONCRETE PIPE - REINFORCED

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Circular culvert, storm sewer, and sanitary sewer pipe.
 2. Perforated pipe.
 3. Elliptical culvert and storm sewer pipe.
 4. Arch culvert and storm sewer pipe.
 5. Box culvert and storm sewer sections.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
1. ASTM C76 Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 2. ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 3. ASTM C444 Standard Specification for Perforated Concrete Pipe
 4. ASTM C497 Standard Test Methods for Concrete Pipe, Concrete Box Sections, Manhole Sections, or Tile.
 5. ASTM C506 Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
 6. ASTM C507 Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
 7. ASTM C877 Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
 8. ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 9. ASTM C1433 Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
- B. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO M198 Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
 2. AASHTO M273 Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers with less than 2 ft. of Cover Subjected to Highway Loadings

1.3 SUBMITTALS

- A. Manufacturer's certification that the material delivered has been satisfactorily tested in accordance with ASTM C497.
- B. Provide a detailed design of the pipe joints and gasket.
- C. Manufacturer's certification that culvert box sections and culvert box endwalls conform with ASTM 1433.

- D. Provide manufacturer's certification that the material for sealing bands conforms with ASTM C-877.
- E. Submittal detailing pipe section and endwall dimensions and class ratings.

1.4 QUALITY ASSURANCE

- A. Pipe shall be available to Owner's Representative for inspection.
- B. Material brands and/or pipe shall not be mixed.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Upon delivery insure that the pipe is clearly marked with the following information:
 - 1. Specification designation.
 - 2. Pipe class or strength designation.
 - 3. Date of manufacture.
 - 4. Name or trademark of manufacturer.
 - 5. Plant identification.
 - 6. Letters E or Q indicating elliptical or quadrant reinforcement.
- B. Store material to protect from damage and do not stack in layers.

PART 2 - PRODUCTS

2.1 CIRCULAR PIPE

- A. Class III conforming to ASTM C76 of the classification stated in the drawings.
- B. Provide bell and spigot joints conforming to ASTM C443 with flat rubber gaskets meeting standard gasket requirements.

2.2 PERFORATED PIPE

- A. Conform to circular pipe requirements.
- B. Conform to the requirements of ASTM C444 Type 1.

2.3 ELLIPTICAL PIPE

- A. Conform to ASTM C507 of the classification stated on the drawings.
- B. Provide tongue and groove joints with flexible plastic Type B gaskets conforming to AASHTO M198 and joint sealants conforming to ASTM C990.

2.4 ARCH PIPE

- A. Conform to ASTM C506 of the classification stated on the drawings.
- B. Provide tongue and groove joints with flexible plastic Type B gaskets conforming to AASHTO M198 and joint sealants conforming to ASTM C990.

2.5 BOX SECTIONS

- A. Conform to ASTM C1433 of the Type identified in the standard.
- B. If the box section has less than 2' of cover, conform to ASTM C1433 of type identified in Table 1 of the standard.

- C. Provide tongue and groove joints with flexible plastic Type B gaskets conforming to AASHTO M198.
- D. Provide External Sealing Bands conforming to ASTM C-877.
- E. Provide reinforced concrete collars in a minimum 6 inch thickness at joints between box sections and box end sections. Reinforcement shall be 2 - #4(E) continuous bars.

2.6 ENDWALLS

- A. Pre-cast reinforced concrete in accordance with the details.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Sanitary Sewer: Use circular pipe ASTM C76 "C" wall.
- B. Storm Sewer and Culverts
 - 1. Use circular pipe ASTM C76 "B" or "C" wall unless stated otherwise on drawings.
 - 2. Use elliptical pipe, arch pipe and box sections only where shown on drawings.
 - 3. Use perforated pipe only where shown on drawings.
- C. Box Sections
 - 1. Bed sections in a minimum of six (6) inches of 1 ¼" base aggregate dense placed to 2 feet beyond the edge of the box section.
 - 2. Seal all joints with a 13-inch wide sealing band centered on the joint.
- D. Endwalls – Furnish at the end of all culverts.

3.2 FIELD QUALITY CONTROL

- A. Inspect and reject pipe for the following defects:
 - 1. Improper marking.
 - 2. Fractures or cracks passing through wall, except for a single end crack that does not exceed depth of joint.
 - 3. Defects indicating non-compliance with proportioning, mixing and molding of the concrete.
 - 4. Surface defects indicating honeycombed or open texture.
 - 5. Ends are not normal to the wall and center line of the pipe.
 - 6. Damaged or cracked ends.
 - 7. Any continuous crack having a width of 0.01 inch or more and extending for a length of 12 inches or more.

END OF SECTION