TECHNICAL SPECIFICATIONS FOR
ORCHARD AVENUE EXTENSION
VILLAGE OF BIRCHWOOD
WASHBURN COUNTY, WI

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Project #00525051

Prepared By:

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CONTENTS AND PROJECT MANUAL INDEX

ITEM NO.	ITEM DESCRIPTION	EST. QTY	UNITS	UNIT PRICE	TOTAL PRICE
1	Mobilization, Bonds, and Insurance	1	LS	$_____	$_____
2	Construction Layout	1	LS	$_____	$_____
3	Stockpile and Haul Excess Topsoil	680	CY	$_____	$_____
4	Geotextile Fabric, Type R	65	SY	$_____	$_____
5	Clearing and Grubbing	1	LS	$_____	$_____
6	Unclassified Excavation (P)	3,050	CY	$_____	$_____
7	Excavation Below Subgrade	300	CY	$_____	$_____
8	Granular Fill	1,490	CY	$_____	$_____
9	Erosion and Sedimentation Controls	1	LS	$_____	$_____
10	Riprap, Medium	25	CY	$_____	$_____
11	Dense Graded Base, 1-1/4-inch (P)	1,410	CY	$_____	$_____
12	Topsoil Placement and Grading (P)	4,650	SY	$_____	$_____
13	Seeding (P)	4,650	SY	$_____	$_____
14	CMP Culvert Pipe, 15-Inch	168	LF	$_____	$_____
15	CMP Culvert Pipe, 18-Inch	43	LF	$_____	$_____
16	CMP Culvert Pipe, 24-Inch	112	LF	$_____	$_____

TOTAL: Items #1-#16 $_____

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern Work of this section.

1.02 APPLICABLE PUBLICATIONS (NONE)

1.03 DESCRIPTION OF WORK

A. Excavation and grading services for an extension of a roadway with an approximate centerline length of 1,300 LF. Roadway will be gravel underlain by sand. Associated work includes (but is not limited to) ditching, culvert installation, and turf restoration.

PART 2 PRODUCTS AND MATERIALS

PART 3 EXECUTION

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS (NONE)

1.03 DESCRIPTION OF WORK

A. Submit preliminary Construction Progress Schedule in accordance with General Conditions prior to pre-construction conference.

B. The Contractor shall comply with and the Work shall be completed in accordance with the following construction schedule:
   1. Award Contract (December 9, 2025– Tentative)
   2. Notice to Proceed (January 13, 2025 – Tentative)
   3. Substantial Completion. Substantial Completion shall be obtained by 7/15/2026. Milestone A shall include all work as shown on the Contract Drawings and detailed in these specifications, including all items addressed in the project punchlists to date, excluding final growth of seeding.
   4. Final Completion. The project shall be completed by 7/30/2026. Final Completion shall include all work as shown on the Contract Drawings and detailed in these specifications, and all items addressed in final project closeout punchlist.
   5. Within 30 days of final completion, submit final project closeout documentation inclusive of lien waivers, affidavit of compliance with prevailing wage rate determination, and final pay request.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

1.05 SUBMITTALS

A. Furnish copies of preliminary schedule, and subsequent revisions thereof, to Owner within three (3) business days of request.

B. Failure to submit schedules on a timely basis shall be considered cause for withholding progress payments.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS (N/A)

PART 3 EXECUTION

3.01 FORM OF SCHEDULE

A. Prepare schedule in form of horizontal bar chart.
   1. Provide separate horizontal bar for each trade, activity or operation.
   2. Provide continuous vertical line to identify first working day of each week.
   3. Scale and space to allow for notations and future revisions.

3.02 CONTENT OF SCHEDULE

A. Show complete sequence of construction by activity or operation.

B. Show dates for beginning and completion of each major element of construction and installation dates for major equipment items. Include:
   1. Each individual task of construction.
   2. Procurement of equipment and systems including Shop Drawing submittals, Engineer's review of submittals, shop tests, and delivery dates.
   3. Identification of Work that will affect existing plant operations.
   4. Services of manufactures' representatives.
   5. Startup dates for major equipment.
   6. Field tests.
   7. Dates of Substantial and Final completion.
   8. Subcontractor Work items.
   9. MBE, WBE, and SBE activities.
   10. O&M data activities
   11. Contractor-provided training.

C. Show projected percentage of completion for each activity as of first day of each month.

3.03 REVISIONS TO SCHEDULE

A. Each month Contractor shall receive update information from Subcontractors and Suppliers that shall be included in current schedule. Revised schedule shall indicate changes such as:
   1. Major changes in scope.
   2. Activities modified since previous submittal.
   3. Revised projections of progress and completion.
   4. Other identifiable changes.

B. Provide narrative report to define following:
   1. Problem area and anticipated delays and their impact on schedule.
   2. Corrective action recommended and its effect.

3.04 DELAYS AND RECOVERY

A. Under no circumstances will addition of equipment or construction forces, increasing working hours or other method, manner or procedure to return to current Construction Progress Schedule be considered justification for Contract modification or treated as acceleration.

PART 4 MEASUREMENT AND PAYMENT

4.01 CONSTRUCTION PROGRESS SCHEDULE

A. General. Construction Progress Schedule shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.
   1. Construction Progress Schedule, Lump Sum. When so provided, payment for construction progress schedule shall be made at the contract lump sum price bid or as specified in Special Procedures - Division 01.
   2. Construction Progress Schedule, Inclusive. When no quantity is provided, construction progress schedule shall be considered inclusive to payment for work associated with administration.

END OF SECTION

SECTION 01 32 23
SURVEY AND LAYOUT DATA

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 1 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS (NONE)

1.03 DESCRIPTION OF WORK

A. The Contractor will stake and layout all work. The Contractor shall immediately, upon entering the site for purpose of beginning work, locate general reference points and take such action as necessary to prevent their destruction. The Contractor shall layout the work and be responsible for all lines, elevations and measurements. The Contractor must exercise proper precaution to verify dimensions of the drawings before laying out work and will be held responsible for any error resulting from failure to exercise such precaution.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

1.05 SUBMITTALS

A. Automated Machine Guidance (AMG) Control / Staking Plan

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS (N/A)

PART 3 EXECUTION

3.01 AUTOMATED MACHINE GUIDANCE (AMG)

A. Contractor may utilize AMG in lieu of or in addition to conventional staking on all or part of the work. When staking is inclusive to construction, any use of AMG will be considered inclusive to associated work.

B. All AMG work must be coordinated with the Owner throughout the course of construction to ensure that work performed using AMG conforms to the contract tolerances and that the methods employed conform to the contractor's AMG Control/Staking Plan and accepted industry standards. The contractor will need to revert to conventional staking methods (at no additional cost to the Owner) for all or part of the work at any point during construction if AMG is producing unacceptable results. Acceptable AMG work will be up to the Owner's discretion.

C. AMG Control/Staking Plan - Submit a detailed AMG plan to the Owner for review at least 5 business days before the preconstruction meeting. This plan should explain, at a minimum, how AMG technology will be integrated into the project, what bid items AMG will be associated with and which, if any, will use conventional staking, and the process for verification of tolerances. The plan shall also include:
   1. An explanation of how AMG Technology will be integrated into the project
   2. A comprehensive list of bid items associated with AMG
   3. A list of any items for which conventional staking will be used (either alone or in conjunction with AMG)
   4. The process for verification of tolerances
   5. The designation of a single primary contact person for AMG technology issues.
   6. A list/diagram of all control points intended for use on the project for verification as required.

7. A description of Contractor's quality control procedures. Include the frequency and type of checks performed to ensure that the work conforms to the contract plans.

Owner will review the plan for conformance with contract documents. Contractor may not perform AMG work prior to receiving written approval of the AMG plan. All work using AMG shall be performed in accordance with the approved AMG plan. Contractor shall submit plan updates to Owner throughout the project as necessary, or as directed by the Owner.

D. AMG Geometric and Surface Information

1. Contractor is responsible for the creating and generating all surface models and any other data required to construct the project to the lines and grades shown on the Contract Drawings. At Contractor's request, Owner may provide an AutoCad Civil3D file and and/or .XML file of the surfaces used to generate the construction plans. The Contractor shall be responsible for comparing electronic data with available hard copies and Contract Documents. Owner and/or Engineer shall not be held responsible for any discrepancies between the linework, surfaces, or digital data provided to the Contractor. The use of any digital files prepared by Engineer shall not in any way obviate the Contractor's responsibility for the proper checking and coordination of dimensions, details, and other information required to facilitate complete and accurate construction.
2. Develop and maintain a contractor construction model for areas of the project employing AMG. Confirm that the resulting model accurately represents the contract plans. At Owner's request, provide the construction model to the Owner in .XML format, or other Owner-approved format.
3. Managing and Updating Information -Notify the Owner of any errors or discrepancies in Owner-provided information. Owner will determine what, if any, revisions may be required. Owner may revise the contract drawings, if necessary, to address errors or discrepancies that the contractor identifies. If the Owner requests, provide construction model updates to the Owner. All Contractor costs for revisions to the surface model, linework, etc. shall be inclusive to the item constructed and no additional money will be paid to the Contractor.
4. Owner shall contact Contractor if design changes are made after the bid if they will affect the digital model. Contractor shall make the appropriate changes to the model or work with Owner in the field to ensure design changes are incorporated into final product. Contractor shall be solely responsible for making adjustments or changes to the model as required.
5. Construction Checks - Check the work against the plan elevation at randomly selected points on cross-sections located on the plans at the frequency the Owner approved as a part of the AMG Control / Staking Plan. Submit the results of these random checks to the Owner daily. Notify the Owner immediately if a check variance exceeds the tolerances specified below. Check the work at additional points as the Owner directs. The Owner may conduct periodic independent checks to verify accuracy with the plans and contract documents.
6. AMG Construction Tolerances

Item	Horizontal	Vertical
Daily Calibrations	0.10 feet*	0.05 feet*
Subgrade	0.25 feet	0.10 feet
Base Aggregate	0.25 feet	0.04 feet
Curb and Gutter	0.02 feet	0.01 feet
Concrete Pavement	0.02 feet	0.01 feet

*or as directed by the Owner

7. Contractor supplemental staking and dry run required by item to assist completing work within construction tolerances:
   a. Subgrade and Base Aggregate
      1) Offset staking required at high/low points, PC, PT, mid-points, and maximum of 400 ft. intervals to ensure necessary accuracy of vertical and horizontal compliance with contract documents.
   b. Culverts
      1) Culverts require placement of 2 benchmarks placed within 100 ft. of each location where work is to be completed to ensure contractor/Owner can verify drainage of existing ground to best fit and record accurate as-built information.

3.02 CONSTRUCTION SURVEY LAYOUT REQUIREMENTS AND TOLERANCES

A. Tolerances for staking shall be 0.02 feet horizontal and 0.01 feet vertical unless otherwise stated.

Construction Staking Tolerances

Item	Horizontal	Vertical
Slope Stakes	0.25 feet	0.10 feet
Structure Layout	0.02 feet	0.01 feet
Sanitary Sewer	0.02 feet	0.01 feet
Water Main	0.10 feet	0.03 feet
Storm Sewer	0.02 feet	0.01 feet
Pipe Culverts	0.25 feet	0.03 feet
Electrical	0.02 feet	0.01 feet
Subgrade	0.25 feet	0.10 feet
Base Aggregate	0.25 feet	0.04 feet
Curb and Gutter	0.02 feet	0.01 feet
Curb Ramps	0.02 feet	0.01 feet
Concrete Pavement	0.02 feet	0.01 feet

PART 4 MEASUREMENT AND PAYMENT

4.01 CONSTRUCTION LAYOUT

A. General. Construction Layout shall be paid for at the bid price for the work as described above in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 1.

1. Construction Layout, Lump Sum. When so provided, payment for Construction Layout shall be made at the contract lump sum price bid or as specified in Special Procedures - Division 1.

END OF SECTION

SECTION 01 35 00
SPECIAL PROCEDURES

CONTENTS: Work under this section is intended to supplement and/or modify the individual specifications. This section does not relieve the Contractor from fulfilling all items in said sections. The numbers of this section are referenced to those of Specifications Divisions 01 through 33.

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00.01 SPECIFICATION EXPLANATION

A. The Special Procedures items will supplement or supersede the standard specifications. The number preceding special provisions refers to standard specifications that are being referenced. Where reference is made to Wisconsin Department of Transportation Specifications, all conditions of said specification will apply except "Payment and Measurement."

00.02 BID QUANTITIES

A. All Bid Quantities are estimated. The Contractor shall field verify all quantities and work prior to submitting a Bid. Final quantities shall be adjusted to reflect the field installed quantities, except for items marked (P) for Plan Quantity. Items marked (P) for Plan Quantity shall be adjusted only if the Engineer authorizes variations from the work shown on the Plan. The unit price in the Bid shall not be adjusted though final quantities may vary. Lump sum prices shall not be adjusted. The Engineer's estimate of quantities as shown in the Bid is approximate and the right is reserved by the Owner to increase or decrease said quantities.

B. The following items will be bid as "Plan Quantity" and the final quantity shall be adjusted only to reflect changes to work authorized by the Owner.
1. Unclassified Excavation
2. Dense Graded Base, 1-1/4 Inch
3. Topsoil Placement and Grading
4. Seeding (with inclusive erosion blanket)

DIVISION 01 - GENERAL REQUIREMENTS

01.01 SECTION 01 14 00 WORK RESTRICTIONS AND PROVISIONS

A. Access: Contractor shall provide emergency access to residents along the project at all times and vehicular access at the end of each working day. All work required to maintain reasonable access shall be considered incidental and related to construction.

B. Monumentation. Survey monuments, property stakes, etc., which are encountered during construction are to be preserved, protected from movement, and left undisturbed. The Engineer is to be made aware of all such items immediately upon discovery. Where construction activities disturb survey monuments it will be the responsibility of the Contractor to hire a professionally licensed surveyor to reinstall survey monuments unless other arrangements are authorized in writing by Engineer and Owner prior to disturbance.

C. Owner's Property: Any material or equipment to be removed from the present construction site shall be the property of the Owner and disposition shall be as directed by the Owner. Coordinate with Owner all items to be salvaged or disposed of. All materials Owner wishes to salvage shall be removed from existing location by Contractor in a workmanlike manner and carefully transported to Owner's storage area. Any material or equipment Owner does not wish to have salvaged shall be properly disposed of by Contractor.

D. Garbage Collection. Contractor shall coordinate with property owners and with garbage collection service providers so that garbage collection continues uninterrupted over the course of the project.

E. Use of Public Water Supply. Contractors may obtain water from the municipal water system at no cost, however usage shall be metered and a record provided to Owner at the end of the project. The Village will

supply a hydrant meter for use during construction. Only hydrants approved by Owner for this purpose may be used by Contractor to obtain water, open hydrants and hydrant wrenches shall not be left unattended.

F. Cleaning of Adjacent Streets and Highways. If construction activities cause dirt or other foreign materials to be deposited on adjacent streets and roadways, Contractor shall clean those streets and roadways as often as needed to prevent affecting driving conditions. This provision does not relieve Contractor from adhering to erosion control provisions stated elsewhere in the plans and specifications.

G. Sanitary Facilities. The Contractor shall supply adequate portable toilet facilities for use during construction.

H. Construction Site Cleanup. The contractor will be responsible for daily construction site cleanup. All garbage, construction debris, debris piles, and any unnecessary messes shall be cleaned up daily. Any excavations, obstacles, or other hazards must be fenced at all times.

I. Relocation and Protection of Utilities. The Contractor shall coordinate the relocation of all utilities as necessary to perform and complete construction. The Contractor shall take measures to protect all utilities. Coordinating relocation of and protection of utilities are inclusive in the Bid. No additional payment will be made for coordinating the relocation of and protection of utilities.

J. Street and Traffic Signs. All street and traffic signs that must be removed to accommodate construction activity shall be salvaged and replaced. Cost shall be considered incidental to the project.

DIVISION 31 - EARTHWORK

31.01 SECTION 31 23 13 SUBGRADE PREPARATION

A. Earthwork (Unclassified Excavation) Quantities. The approximate quantity of earthwork to be included in the unit price bid for unclassified excavation is listed in the bid table. The figures are Engineer's estimates only; Contractor shall be responsible to verify these quantities. No allowance has been made for shrinkage, swell or topsoil removal.

B. Subgrade Protection. Contractor shall provide subgrade protection of roadway from ponding water and promote positive drainage for the site. No additional quantities, money, or time shall be allowed to the contractor to replace initial roadway subgrade material that becomes unsuitable during construction due to the Contractor's construction methods and/or negligence.

C. Unclassified Excavation - Measurement and Payment. Material moved on the project shall be measured a single time for payment by cubic yard. As excavation (cut) is expected to exceed embankment (fill) on this project, measurement shall be per cubic yard of material excavated and removed. Unclassified excavation shall be paid for at the unit price bid per cubic yard for the plan quantity (P) designated in the bid proposal form unless such quantity is disputed prior to the start of any work. If the plan quantity is in dispute, Contractor shall notify Owner prior to the start of any work. Owner and Contractor may negotiate an agreed upon quantity prior to the start of work, or Owner will measure the quantities during construction and payment will be made on the basis of computations from these measurements. The unit price shall include all labor, equipment and materials necessary for the completion of this item.

D. Excess Material. Excess material shall be disposed of by the Contractor except for excess topsoil. The Village would like the excess topsoil hauled to the Village Shop (or a possible secondary location within the Village limits). All costs associated with transport and/or disposal of this material shall be included in the most closely related bid item.

E. Stockpile and Haul Excess Topsoil. The Village would like the excess topsoil hauled to the Village Shop (or a possible secondary location within the Village limits). All costs associated with loading, transport, and placement of this material shall be included in the unit price bid item "Stockpile and Haul Excess Topsoil".

F. Excavation Below Subgrade (EBS). There are no planned areas of EBS. This item shall be used if unsuitable subgrade material is found to exist in project areas. If no unsuitable material is found, this item will be removed from the contract. Unsuitable subgrade will be determined during or prior to subgrade test roll, and engineer must approve any areas of EBS on the project. Areas excavated without Engineer approval shall be at Contractor's cost.

G. Excavation Below Subgrade (EBS) – Measurement and Payment. The unit price bid for Excavation Below Subgrade shall include the cost to excavate, remove and dispose of unstable material, and to furnish and install 3"-6" breaker run in the excavated area in accordance with the section titled "Subgrade Preparation" in Division 31. All costs for the removal and disposal of unsuitable material, furnishing and placing select crushed material, grading of sub-grade to tolerance and any incidental items necessary to complete the excavation shall be included in the unit price bid for "Excavation Below Subgrade."

31.02 SECTION 31 25 00 – EROSION AND SEDIMENTATION CONTROLS

A. Contractor shall be responsible for installing and maintaining all temporary and permanent erosion control measures shown on the plan and/or permit and for removing temporary erosion control measures when the project site has stabilized.

B. Contractor shall use a construction sequence designed to minimize potential erosion from the site.

C. Contractor shall be responsible for inspection of all Erosion Control devices at least weekly or after any rainfall of one-half inch or more, and shall continue until site restoration is considered "stabilized," even during times when no construction activity is taking place. Contractor shall maintain Erosion Control Inspection forms in a binder on site, and provide a copy of each inspection form to the Owner within 24 hours of the inspection (electronic copy will be acceptable.)

D. If Contractor's operations expand the project site beyond the limits of the Erosion Control Plan, Contractor shall notify Engineer immediately and provide appropriate additional erosion control measures at no additional cost to the Owner. If an amendment to the Erosion Control Plan and permit is required due to additional disturbed areas, Contractor shall be responsible for all costs, including Engineering fees, associated with obtaining the amended approval.

E. Contractor shall be eligible for payment for erosion control at the following milestones:
1. Up to 50% payment upon installation of all erosion control devices
2. Up to 80% payment at time of substantial completion
3. Final 20% shall be after site is stabilized and erosion control measures have been removed by the contractor.

DIVISION 32 - EXTERIOR IMPROVEMENTS

32.01 SECTION 32 11 23 AGGREGATE BASE AND SUBBASE

A. Dense Graded Base, 1 ¼-INCH. Dense Graded Base shall conform to the requirements of Base Aggregate Dense 1¼-inch as defined in the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

B. Dense Graded Base, Driveways. Driveway areas disturbed due to construction shall be restored with 6-inches of compacted dense graded base (in addition to in-kind replacement of pavement). All costs for installing aggregate base for driveways shall be included in the unit price bid for Dense Graded Base.

32.02 SECTION 32 91 19.13 TOPSOIL PLACEMENT AND GRADING

A. Topsoil Placement and Grading – Payment. Topsoil will be paid for at the unit price bid per square yard. The quantity to be paid will be the plan quantity (P) designated in the bid proposal form, and will be adjusted only if the Engineer authorizes variations from the work shown on the Plan unless such quantity is disputed by Contractor in writing prior to the start of any work. If the plan quantity is in dispute,

Contractor and Engineer may negotiate an agreed upon quantity prior to the start of work, or Engineer will measure the quantities during construction and payment will be made on the basis of these measurements.

32.03 SECTION 32 92 19 – SEEDING

A. Seed Mixture. Contractor shall supply a WisDOT State Mix #40 or approved equal mix for all areas of the project. Submit seed mix design, proposed seeding rate and fertilizer mix to Engineer prior to seeding.

B. Erosion Blanket. In lieu of mulch, Curlex NetFree 100% Biodegradable Erosion Blanket (or equivalent net-free erosion blanket) shall be used. “Erosion blanket” will be considered inclusive to seeding.

C. Seeding- Payment. Seeding will be paid for at the unit price bid per square yard. The quantity to be paid will be the plan quantity (P) designated in the bid proposal form and will be adjusted only if the Engineer authorizes variations from the work shown on the Plan unless such quantity is disputed by Contractor in writing prior to the start of any work. If the plan quantity is in dispute, Contractor and Engineer may negotiate an agreed upon quantity prior to the start of work, or Engineer will measure the quantities during construction and payment will be made on the basis of these measurements. Partial progress payments will not be made for seeding; payment will be made when the entirety of seeding is completed and work is accepted.

END OF SECTION

SECTION 01 41 26
PERMITS

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.
1.

1.02 APPLICABLE PUBLICATIONS (NONE)

1.03 DESCRIPTION OF WORK

A. The Contractor shall comply in all ways with the requirements of the following permits:
Wisconsin DNR General WPDES Permit for Storm Water Discharge from a Construction Site

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)
1.

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS (N/A)

PART 3 EXECUTION (N/A)

PART 4 MEASUREMENT AND PAYMENT (N/A)

END OF SECTION

SECTION 01 71 13
MOBILIZATION

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS (NONE)

1.03 DESCRIPTION OF WORK

A. This section describes the work and operations necessary to move personnel, equipment, supplies, and incidentals to the project site and to establish the Contractor's offices, buildings, sanitary accommodations, and other facilities necessary to work on the project. It also includes all other work and operations whose performance is required, or for costs necessarily incurred before beginning work on various items on the project site. The work may also include obtaining bonds, insurance and permits and demobilizing.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS (N/A)

PART 3 EXECUTION (N/A)

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. Mobilization shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures – Division 01.

4.02 MOBILIZATION

A. Mobilization, Lump Sum. When so provided, payment for mobilization shall be made at the contract lump sum price bid. Partial payment for mobilization may be requested as follows:
   1. When 5% of the original contract amount has been completed, 25% of the contract price for Mobilization may be included in the Application for Payment.
   2. When 20% of the original contract amount has been completed, 50% of the contract price for Mobilization may be included in the Application for Payment.
   3. When 50% of the original contract amount has been completed, 80% of the contract price for Mobilization may be included in the Application for Payment.
   4. When 100% of the contract amount has been completed, 100% of the contract price for Mobilization may be included in the Application for Payment.

B. Mobilization, Incidental. If the bid table does not include a separate Mobilization bid item, the work necessary for mobilization is incidental to work included under other contract bid items.

END OF SECTION

SECTION 02 01 00
MAINTENANCE OF EXISTING CONDITIONS

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work under this section shall cover all materials, equipment, supervision, and labor necessary for surface restoration. The various street surfaces disturbed, damaged, or destroyed during the performance of the work under this contract shall be restored and maintained as shown, specified, and directed. Included in this classification are pavement surfaces of all types, pavement bases, shoulders, and appurtenances as driveways, curb and gutter sections, sidewalks, alleys, and all other miscellaneous surfaces required but not designated under other sections of these specifications.

B. A schedule of restoration of the pavement surfaces shall be worked out by the Contractor and approved by the Owner. The schedule shall be adhered to unless subsequent changes are approved by the Owner.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Subgrade Preparation - Division 31

C. Aggregate Base and Subbase - Division 32

1.05 SUBMITTALS

A. Contractor shall submit such product literature and catalog cuts of materials to be supplied to relate these materials to these specifications. Information shall be in conformance with requirements of Submittals - Division 01 of these specifications.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 GENERAL

A. Materials shall comply with the respective sections of Divisions 03, 31, and 32 of these specifications, as they are applicable, and those of the State of Wisconsin, Department of Transportation, Standard Specifications to the extent indicated by the reference thereto.

2.02 PAVEMENT SURFACE AND APPURTENANCES

A. Asphaltic concrete pavement and appurtenances shall conform to the requirements specified in Asphaltic Concrete Pavement - Division 32 or as specified in Special Procedures - Division 01.

B. Concrete pavement and appurtenances shall conform to the requirements specified in Cast-in-Place Concrete - Division 03 or as specified in Special Procedures - Division 01.

PART 3 EXECUTION

3.01 GENERAL

A. Workmanship shall comply with the respective sections of Divisions 03, 31, and 32 of these specifications, as they are applicable, and those of the State of Wisconsin, Department of Transportation, Standard Specifications to the extent indicated by the reference thereto.

3.02 TEMPORARY RESTORATION

A. Upon completion of backfilling, the pavement surface damaged or destroyed shall be temporarily restored by the Contractor.
   1. The pavement shall be temporarily restored by placing on a prepared subgrade a base consisting of crushed gravel or crushed stone. The base shall have a minimum thickness of 8 inches plus the thickness of the permanent type of pavement to be replaced, or greater thickness if necessary to conform to the thickness of the base disturbed or removed, and shall be placed at the proper line and grade.
   2. Temporary pavement shall be maintained in a suitable and safe condition for traffic until the permanent pavement is laid.

B. Type I backfill shall be used under all paved streets, paved roads, driveways, sidewalks and curb and gutter sections.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Maintenance of existing conditions shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 MAINTENANCE OF EXISTING CONDITIONS

A. Maintenance of Existing Conditions, Inclusive. When no quantity is provided, maintenance of existing conditions shall be considered inclusive to payment for work associated.

END OF SECTION

SECTION 31 05 19.13
GEOSYNTHETICS FOR EARTHWORK

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards, Current Edition.
   2. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work under this section shall cover furnishing and installing geotextile fabrics for subgrade separation and stabilization, and under riprap in accordance with the contract drawings and specified herein, and in accordance with Section 645 of the State of Wisconsin, Department of Transportation, Standard Specifications.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Submittals - Division 01

C. Subgrade Preparation - Division 31

D. Riprap - Division 31

1.05 SUBMITTALS

A. Contractor shall submit such product literature and catalog cuts of materials to be supplied to relate these materials to the specifications. Information shall be in conformance with requirements of Submittals - Division 01 of these specifications.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 GENERAL

A. The geotextile fabric shall consist of either woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene or polyvinylidene chloride. All fabric shall have the minimum strength values in the weakest principal direction. Nonwoven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof.

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

C. The geotextile fabric shall be furnished in a wrapping which will protect the fabric from ultraviolet radiation and from abrasion due to shipping and hauling. The geotextile is to be kept dry until installed.

D. The geotextile fabric rolls shall be clearly marked showing the type of fabric.

E. Samples of fabric for testing may be obtained from the job site as specified herein or as determined by the Engineer.

F. If sewn seams are used, the Contractor shall furnish 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.

G. All numerical values specified below 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).

2.02 GEOTEXTILE FABRIC, TYPE SAS (SUBGRADE AGGREGATE SEPARATION)

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

Test	Method	Value
Grab Tensile Strength, lbs	ASTM D 4632	170 min.
Apparent Opening Size, U.S. Standard Sieve	ASTM D 4751	70 max.
Permittivity, SEC^{-1}	ASTM D 4491	0.35 min.

B. Acceptable materials are Geotex 701, Thrace-LINQ 160EX, Mirafi 170N, and US 180 NW, or equal.

2.03 GEOTEXTILE FABRIC, TYPE R (RIPRAP)

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

Test	Method	Value
Grab Tensile Strength, lbs	ASTM D 4632	200 min.
CBR Puncture Strength	ASTM D 6241	500 min.
Apparent Breaking Elongation, Percent	ASTM D 4632	20 min.
Apparent Opening Size, U.S. Standard Sieve	ASTM D 4751	30 max.
Permittivity, SEC^{-1}	ASTM D 4491	0.40 min.

B. Acceptable materials are Geotex 801, Thrace-LINQ 180EX, Mirafi 180N, and US NW 205, or equal.

2.04 GEOTEXTILE FABRIC, TYPE HR (HEAVY RIPRAP)

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

Test	Method	Value
Grab Tensile Strength, lbs	ASTM D 4632	300 min.
CBR Puncture Strength	ASTM D 6241	800 min.
Apparent Breaking Elongation, Percent	ASTM D 4632	20 min.
Apparent Opening Size, U.S. Standard Sieve	ASTM D 4751	30 max.
Permittivity, SEC^{-1}	ASTM D 4491	0.40 min.

B. Acceptable materials are Geotex 1201, Thrace-LINQ 275EX, Mirafi 1120N, Mirafi HP370, and US 300 NW, or equal.

PART 3 EXECUTION

3.01 GENERAL

A. Installation procedures shall be in accordance with manufacturer's recommendations and as specified herein.

B. Sewing. All factory and field seams shall be sewn with a thread having the same or greater durability as the material in the fabric. A 401 stitch conforming to Federal Standard No. 751a shall be used for all seams. All

seams shall develop a tensile strength equal to or greater than 60 percent of the specified grab tensile strength of the fabric, unless otherwise specified.

3.02 GEOTEXTILE FABRIC, TYPE SAS

A. Prior to the placement of the geotextile fabric, the subgrade shall be smoothed, shaped and compacted to the required grade, section, and density. After the fabric has been placed on the subgrade area, no traffic or construction equipment will be permitted to travel directly on the fabric.

B. The fabric shall be rolled out on the roadway and pulled taut manually to remove wrinkles. Separate pieces of fabric shall be joined by overlapping or sewing. The fabric in the overlapped joints shall be placed with a minimum overlap of 18 inches.

C. Weight or pins may be required to prevent lifting of the fabric by wind.

D. After placement, the fabric shall be exposed no longer than 48 hours prior to covering.

E. The base course material shall be placed over the fabric by back dumping with trucks and leveling with a crawler dozer. Construction equipment shall be such that ruts do not exceed 3 inches in depth. All ruts shall be filled with additional material. The smoothing of ruts without adding additional material will not be permitted. Damaged areas shall be covered with a patch of fabric using a 36 inch overlap in all directions.

3.03 GEOTEXTILE FABRIC, TYPE R

A. The area shall be graded smooth and all stones, roots, sticks, or other foreign material which would interfere with the fabric being completely in contact with the soil shall be removed prior to placing the fabric.

B. The fabric shall be placed loosely and laid parallel to the direction of the water movement. Pinning or stapling may be required to hold the geotextile in place. Separate pieces of fabric shall be joined by overlapping or sewing. The fabric in the overlapped joints shall be placed with a minimum overlap of 24 inches in the direction of the flow.

C. After placement, the fabric shall be exposed no longer than 48 hours prior to covering.

D. Damaged areas shall be covered with a patch of fabric using a 36 inch overlap in all directions.

E. Placement of riprap shall be from the base of the slope upward. Height of free fall of riprap shall be determined by the Engineer but in no case shall this height exceed 12 inches.

3.04 GEOTEXTILE FABRIC, TYPE HR

A. The construction methods for Type HR fabric shall conform to the requirements of Subsection 3.03, except that the height of freefall of riprap shall not exceed 6 inches.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Geosynthetics for earthworks shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 GEOTEXTILE FABRIC

A. Geotextile Fabric, [Type], Square Yards. The measurement for geotextile fabric of the specified type shall be by the square yard of surface area upon which the geotextile fabric has been placed. Payment shall be made at the contract unit price bid per square yard of geotextile fabric of the specified type installed, as measured.

END OF SECTION

SECTION 31 11 00
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. Under this item the Contractor shall furnish all equipment and labor necessary to cut and dispose of any vegetation within the clearing limits as described in this section and specified herein.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS (N/A)

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Clearing and Grubbing shall consist of cutting and disposing of trees, brush, windfalls, logs, and other vegetation occurring within the clearing limits, and the removing and disposing of roots, stumps, stubs, grubs, logs and other timber from within the grubbing limits.

B. All work performed under this section shall be done in accordance with Subsection 201.3 of the State of Wisconsin, Department of Transportation, Standard Specifications, with the following exceptions and additions:
   1. Clearing and Grubbing Limits defined as follows:
      a. Trees/brush as individually marked for removal.
      b. Between lines 3 feet outside the grading limits (slope-intercept line) of the roadway cuts and fills, including intercepting embankments, channels, ditches, borrow pits, and marsh or waste disposal area.
      c. Other parts of the right-of-way as designated in the plans or special provisions.
      d. With Engineer's approval, areas with vegetation that interferes with excavation, embankment, or other construction operations.
      e. At no time shall Clearing and Grubbing operations extend beyond the right-of-way without written approval from both Engineer and Owner.
      f. At no time shall Clearing and Grubbing operations occur on trees, brush, or other vegetation clearly marked for preservation.

3.02 DISPOSAL OF MATERIALS

A. Material removed shall be removed from the site and disposed of by the Contractor in accordance with all local codes and ordinances.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Clearing and Grubbing shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

C. The following incidental Clearing and Grubbing operations required to perform the work will not be measured, and will be considered inclusive to the work for which the incidental Clearing and Grubbing must occur:

1. Clearing areas of light brush, shrubs, and other vegetation that Contractor removes with a brush scythe or mowing machine.
2. Clearing areas containing logs, tree roots, roots of brush and shrubs, and other vegetation having a woody structure that the Contractor can remove with a rooter.
3. Trimming overhanging limbs and branches to provide required clearance.
4. Clearing and Grubbing borrow pits.

4.02 CLEARING AND GRUBBING

A. Clearing and Grubbing, Lump Sum. When so provided, payment for Clearing and Grubbing shall be made at the contract lump sum price bid or as specified in Special Procedures - Division 01.

END OF SECTION

SECTION 31 22 00
GRADING

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work covered under this section shall consist of furnishing all material, equipment, and labor required to execute the grading for this project.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Structural Excavation for Structures - Division 31

C. Trenching and Backfilling - Division 31

D. Erosion and Sedimentation Controls - Division 31

E. Topsoil Placement and Grading - Division 32

F. Seeding - Division 32

G. Sodding - Division 32

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS (NONE)

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING UTILITIES

A. Locate existing underground utilities in the areas of work before starting grading operations and provide adequate means of protection during earthwork operations. Should uncharted or incorrectly charted piping or other utilities be encountered during grading, consult the Engineer immediately for directions on how to proceed. Cooperate with the Owner, and public and private utility companies in keeping their respective services and facilities in operation.

B. Repair damaged utilities to the satisfaction of the utility owner.

3.02 PRESERVATION OF TREES AND SHRUBS

A. Trees and shrubs to be preserved shall be thoroughly protected from scarring or other injury during grading operations. Excavation operations shall not disturb the original ground around trees within a distance of one foot or twice the diameter of the tree, whichever is greater. Exposed roots resulting from excavation shall be cut cleanly and covered with humus-bearing soil.

B. When necessary or required by the Contract Documents, trees or shrubs around which embankment is placed shall be protected by tree wells built in accordance with detailed drawings or as laid out in the field by the Owner or Engineer.

3.03 GRADING

A. General. All areas within the project limits shall be graded to the finished grades, lines and details less an allowance for topsoil and/or sod depth, pavement, base and structures.

B. Construction Methods. Grading shall be performed in accordance with Sections 205, 206, 207, and 208, of the State of Wisconsin, Department of Transportation Standard Specifications. If borrow is needed to provide the grades and elevations required, a borrow area will be selected by the Owner. The borrow area shall be restored to smooth lines, topsoiled with a minimum of 6 inches of salvaged topsoil and seeded.

C. Tolerance. Finish earth grades shall be in reasonably close conformity with the lines, grades and thickness shown on the contract drawings or established by the Engineer with particular concern for drainage and appearance. Finish earth grades along buildings or structures, under and adjacent to pavements and in drainageways shall be within 0.10 foot of those staked or shown on the contract drawings. Grades in all other areas shall be within 0.50 foot unless drainage considerations require more accuracy.

3.04 DRAINAGE

A. During construction, ditches and channels shall be drained by keeping the excavation areas and embankment sloped to the approximate section of the final earth grade. If existing surface drainage must be interrupted, temporary drainage shall be provided.

B. Construction in and adjacent to flowing streams shall be performed to avoid washing, sloughing or deposition of materials into the channel which may obstruct or impair stream flow, or which may result in contamination and/or silting of the stream.

C. Precautions shall be taken to preserve, protect, and continue service of all existing tile drains, sewers, and other subsurface utilities; repair any damage to drains, sewers, and utilities.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Grading shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 GRADING

A. Grading, Inclusive. When no quantity is provided, grading shall be in inclusive to payment for work associated with related utility or infrastructure improvement.

END OF SECTION

SECTION 31 23 13
SUBGRADE PREPARATION

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work under this section shall cover furnishing all material, equipment, and labor required to execute the earthwork for this project in accordance with Sections 201 through 214 of the State of Wisconsin, Department of Transportation Standard Specifications.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Erosion and Sedimentation Controls - Division 31

C. Aggregate Base and Subbase - Division 32

D. Topsoil Placement and Grading - Division 32

E. Seeding - Division 32

F. Sodding - Division 32

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS (N/A)

PART 3 EXECUTION

3.01 PRESERVATION OF TREES AND SHRUBS

A. Trees and shrubs to be preserved shall be thoroughly protected from scarring or other injury during grading operations. Excavation operations shall not disturb the original ground around trees within a distance of one foot or twice the diameter of the tree, whichever is greater. Exposed roots resulting from excavation shall be cut cleanly and covered with humus-bearing soil.

B. When necessary or required by the Contract Documents, trees or shrubs around which embankment is placed shall be protected by tree wells built in accordance with Detailed Drawings or as laid out in the field by the Owner or Engineer.

3.02 UNCLASSIFIED EXCAVATION AND GRADING

A. Excavation to subgrade shall be performed to provide a finished subgrade prepared for the application of crushed aggregate, curb and gutter, sidewalks and topsoil as shown on the typical section.

B. Also included is the removal and disposal of existing stumps, trees, miscellaneous structures and rubble as shown on the contract drawings and any other obstructions encountered which interfere with the proposed construction. Stumps shown on contract drawings to be removed from terraces or backslopes shall be shredded to a minimum of 6 inches below finish subgrade or otherwise removed by the Contractor.

C. Driveways shall be graded to a 10:1 maximum slope to match proposed construction.

D. The Contractor shall adjust all valve boxes, manhole frames, and other utility appurtenances to within 1 inch of the final grade as shown on the contract drawings or as staked in the field by the Engineer.

3.03 FILLING

A. All suitable excavated material shall be used for roadway construction, and at other places shown on the drawings.

B. Fill shall be spread in successive uniform horizontal layers not exceeding 9 inches in depth over entire area before compaction. Each layer shall be worked to break down clods over 6 inches in size and to secure uniform moisture content. Where filling in 9 inch layers is not feasible, as in the case of filling in water or over steep slopes, construct fill in one layer to the minimum elevation at which equipment can be operated. Above this elevation, the fill shall be constructed in layers of the specified depth.

C. Compact each layer of fill material to the following percentage of maximum dry density per modified proctor (ASTM D1557).
   1. 91 percent for fine grained soils (more than 50 percent passing the No. 200 sieve).
   2. 93 percent for coarse-grained soils (less than 50 percent passing the No. 200 sieve).

3.04 PREPARATION OF SUBGRADE

A. The preparation of the subgrade shall consist of bringing the area to be paved to a subgrade conforming to the required grade and cross section, of uniform density, ready to receive the base course. This is to be accomplished by excavating or backfilling as needed, shaping, watering as required, or permitting to dry to proper consistency, and rolling the entire area with an approved self-propelled roller weighing not less than 8 tons. Shaping and rolling shall be continued until the subgrade has been properly prepared and shows that no further compaction of any practical benefit would result from continued compaction. The subgrade shall be tested as to cross section, crown, and elevation. After being properly prepared, it shall be so maintained until the base course is constructed. A completed subgrade shall be maintained sufficiently in advance of the base course operations to permit proper control. Any part of the subgrade area not accessible to a roller shall be thoroughly compacted by hand or mechanical compaction in a manner acceptable to the Engineer. This work shall be in accordance with Section 211 of the State of Wisconsin, Department of Transportation Standard Specifications.

3.05 UNSTABLE SUBBASE/EXCAVATION BELOW SUBGRADE (EBS)

A. Deposits of frost-heave material, unstable soils, topsoil containing considerable amounts of organic matter, or other undesirable foundation material shall be removed from the area within the roadbed depths as shown on the drawings or as directed by the Engineer and shall be replaced as directed by the Engineer in the field.

B. Contractor shall notify the Engineer of any questionable material. The work shall be performed in accordance with Section 205 of the State of Wisconsin, Department of Transportation, Standard Specifications.

3.06 DRAINAGE

A. During construction, ditches and channels shall be drained at all times by keeping the excavation areas and embankments sloped to the approximate section of the final earth grade. If existing surface drainage must be interrupted, temporary drainage shall be provided.

B. Construction in and adjacent to flowing streams shall be performed to avoid washing, sloughing or deposition of materials into the channel which may obstruct or impair stream flow, or which may result in contamination and/or silting of the stream.

C. Precautions shall be taken to preserve, protect, and continue service of all existing tile drains, sewers, and other subsurface utilities; repair any damage to drains, sewers and utilities.

3.07 TESTING

A. A testing laboratory will perform compaction and density tests at locations determined by the Owner's Authorized Representative. Where tests indicate that the subgrade does not conform to the compaction density specified, the subgrade shall be replaced or re-worked until it does conform.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Subgrade preparation shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 UNCLASSIFIED EXCAVATION

A. Unclassified Excavation, Cubic Yards. The measurement and payment for this item shall be per cubic yard. Measurement shall be taken in the field by cross sections before excavation and after topsoiling is placed, where required. Payment shall be made at the contract unit price bid per cubic yard of unclassified excavation.

4.03 UNSTABLE SUBBASE/EXCAVATION BELOW SUBGRADE

A. Excavation Below Subgrade, Cubic Yards. The measurement and payment for this item shall be per cubic yard. Measurement shall be taken in the field by cross sections before any excavation below subgrade takes place and after a stable subbase is reached. Payment shall be made at the contract unit price bid per cubic yard of excavation below subgrade.

END OF SECTION

SECTION 31 23 23.14
GRANULAR FILL

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.
   2. American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards, Current Edition.

1.03 DESCRIPTION OF WORK

A. The work covered under this section shall consist of furnishing all material, equipment, and labor required to execute the filling, compaction, and testing of all subgrade excavations for this project.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Subgrade Preparation - Division 31

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 GRANULAR FILL

A. All granular subbase and granular fill materials shall conform to Section 209 of the State of Wisconsin, Department of Transportation, Standard Specifications.

B. Unless otherwise noted in the Contract Drawings or specifications, all Granular Backfill material shall be Grade 1 Backfill in accordance with the gradation requirements of Section 209 of the State of Wisconsin, Department of Transportation, Standard Specifications.

PART 3 EXECUTION

3.01 COMPACTION

A. Granular fill materials shall be mechanically compacted in 6 inch to 8 inch lifts to 93 percent maximum dry density per modified proctor (ASTM-D1557).

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Granular fill shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 GRANULAR FILL

A. Granular Fill, Cubic Yards. The measurement for granular fill shall be by the cubic yard truck volume or as specified in Special Procedures - Division 01. Payment shall be made at the contract unit price bid per cubic yard of granular fill installed, as measured or as specified in Special Procedures - Division 01.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Natural Resources (WDNR), Conservation Practice Standards, Current Edition.
   2. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work under this section shall cover providing the necessary materials, equipment and labor to control erosion and sedimentation controls by the methods specified herein. If no specific quantities are shown on the contract drawings, the Contractor shall use whatever quantities are necessary to prevent sediment transport off the job site, into permanent manmade storm water conveyances or management facilities or to Waters of the State.

B. The Contractor will be required to provide erosion control as per the current edition of the applicable State of Wisconsin, Department of Natural Resources (WDNR), Conservation Practice Standards. Copies of these standards can be obtained by contacting the following:

State of Wisconsin Department of Natural Resources
Non-Point Source and Land Management Section
101 South Webster Street, P.O. Box 7921
Madison, WI 53707-7921

or by visiting the following website:
http://dnr.wi.gov/topic/stormwater/standards/const_standards.html

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Clearing and Grubbing - Division 31

C. Grading - Division 31

D. Subgrade Preparation - Division 31

E. Riprap - Division 31

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 TOPSOIL

A. Topsoil shall be fertile, friable, natural loam surface soil, reasonably free of subsoil, clay lumps, brush, weeds and free of roots, stumps, stones larger than 2 inches in any dimension, and other matter harmful to plant growth. Topsoil to supplement insufficient topsoil on the site shall originate from local sources, but not from bogs or marshes.

2.02 LIME

A. Lime used for soil amendment shall be agricultural grade limestone ground sufficiently fine so that 80 percent passes a No. 8 sieve. Lime shall contain 80 percent calcium carbonate equivalent. Moisture shall not exceed 10 percent.

2.03 FERTILIZER

A. Fertilizer used in conjunction with seeding shall be dry, free-flowing granular fertilizer suitable for application by agricultural fertilizer spreaders or blower equipment, or non-volatile liquid commercial fertilizer, having an analysis of 20-10-10 (Nitrogen-Phosphoric Acid-Potash), or equal, unless use of phosphorus based fertilizers are banned by the community where the work is to be completed. In such communities, an analysis of 20-0-10, or equal, shall be used. Fertilizer having other analysis shall be applied at a rate to achieve at least the individual following amounts of nutrient per unit area:

Nutrient	Application Rate (Per Acre)	Application Rate (Per 1000 Sq. Ft.)
Nitrogen (N)	100 pounds	2.3 pounds
Phosphoric Acid (P_2O_5)	50 pounds	1.2 pounds
Potash (K_2O)	50 pounds	1.2 pounds

2.04 SEEDING FOR CONSTRUCTION SITE EROSION CONTROL

A. Seeding for Construction Sites shall conform with Wisconsin DNR Conservation Practice Standard 1059.

B. Seed mixtures shall conform to one of the following:
1. WisDOT, 2003. State of Wisconsin Standard Specifications For Highway and Structure Construction. Section 630, Seeding.
2. United States Department of Agriculture – Natural Resource Conservation Service Field Office Technical Guide Section IV, Standard 342, Critical Area Planting.
3. UWEX Publication A3434 Lawn and Establishment & Renovation.

C. All seed shall conform to the requirements of the Wisconsin Statutes and of the Administrative Code Chapter ATCP 20.01 regarding noxious weed seed content and labeling.

D. Seed mixtures that contain potentially invasive species or species that may be harmful to native plant communities shall be avoided.

E. Seed shall not be used later than one year after the test date that appears on the label.

F. Seed shall be tested for purity, germination and noxious weed seed content and shall meet the minimum purity and germination requirements as prescribed in the current edition of Rules for Testing Seed, published by the Association of Official Seed Analysts.

2.05 MULCH FOR CONSTRUCTION SITES

A. Mulching for construction sites shall conform with Wisconsin DNR Conservation Practice Standard 1058.

B. Mulch shall consist of natural biodegradable material such as plant residue (including but not limited to straw, hay, wood chips, bark and wood cellulose fiber), or other equivalent materials of sufficient dimension (depth or thickness) and durability to achieve the intended effect for the required time period.

C. Mulch shall be environmentally harmless to wildlife and plants. Materials such as gravel, plastic, fabric, sawdust, municipal solid waste, solid waste byproducts1, shredded paper, and non-biodegradable products shall not be used.

D. Mulch shall be free of diseased plant residue (i.e., oak wilt), noxious weed seeds, harmful chemical residues, heavy metals, hydrocarbons and other known environmental toxicants.

E. Marsh hay shall not be used as mulch in lowland areas but may be used on upland sites to prevent the spread of invasive, nonnative species (i.e., reed canary grass) commonly found in marsh hay.

F. Straw and hay mulch that will be crimped shall have a minimum fiber length of 6 inches.

G. Wood chips or wood bark shall only be used for sites that are not seeded.

2.06 EROSION MAT

A. Non-Channel Erosion Mat products shall conform with Wisconsin DNR Conservation Practice Standard 1052.

B. Channel Erosion Mat products shall conform with Wisconsin DNR Conservation Practice Standard 1053.

C. Erosion mat shall conform to the requirements of the State of Wisconsin, Department of Transportation, Product Acceptability List (PAL) for Erosion Control Revegetative Mat (ECRM) and Turf-Reinforcement Mat (TRM).

D. For mats that utilize netting, the netting shall be bonded to the parent material to prevent separation of the net for the life of the product.

E. For urban class mats the following material requirements shall be adhered to:
1. Only 100% organic biodegradable netted products are allowed, including parent material, stitching, and netting.
2. The netting shall be stitched with biodegradable thread/yarn to prevent separation of the net from parent material.
3. All materials and additive components used to manufacture the anchoring devices shall be completely biodegradable as determined by ASTM D 5338.
4. Mats with photodegradable netting shall not be installed after September 1st.
5. Steel wire pins or staples shall not be used in lawns.

2.07 SEEDING AND SODDING

A. Seeding and sodding shall conform to Seeding - Division 32 and Sodding - Division 32.

2.08 STRAW BALE EROSION BARRIERS

A. Straw Bale (Sediment Bale Barriers) shall conform with Wisconsin DNR Conservation Practice Standard 1055.

B. Bales used for erosion control shall be either hay or straw, shall have rectangular surfaces, and shall be tightly bound with twine, not wire. The material in the bales shall be reasonably free of grain, weed seed and mold, and shall be dry and suitable for the purpose intended.

C. The minimum cross sectional area for wood stakes shall be 2.0 by 2.0 inches nominal.

D. The minimum diameter of steel (rebar) stakes shall be one-half inch.

2.09 SEDIMENT CONTROL FENCE (SILT FENCE)

A. Silt Fence shall conform with Wisconsin DNR Conservation Practice Standard 1056.

B. Silt fence shall be in accordance with Section 628.2.6 of the State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction.

C. Wood Posts:
1. Wood Posts used to support the fabric shall be at least 1-⅛ inch x 1-⅛ inch in cross-section and shall be a minimum of 4 feet with a minimum in ground depth of 2 feet. Posts shall be made from kiln-dried hickory or Oak.
2. Staples used to attach silt fence to wood posts shall be at least 0.5-inches in length.

D. Steel Supports:
1. Steel posts shall be at least 5 feet long with a strength of 1.33 pounds per foot and shall have projections for the attachment of fasteners.
2. The silt fence fabric shall be attached in at least three places on the upslope side with 50 pound plastic tie straps or wire fasteners.

E. Silt fence shall have a support cord.

F. The Contractor shall furnish upon request a manufacturer's Certificate of Compliance that the geotextile fabric as furnished meets the above requirements.

G. Silt Fence shall be installed in accordance with Wisconsin DNR Conservation Practice Standard 1056.

2.10 STONE DITCH CHECKS

A. Stone Ditch Checks shall be installed in accordance with Wisconsin DNR Conservation Practice Standard 1062.

2.11 RIPRAP

A. Riprap shall be established in accordance with Riprap - Division 31 of this specification.

2.12 LAND APPLICATION OF POLYACRYLAMIDE

A. Land Application of Polyacrylamide shall be performed in accordance with Wisconsin DNR Conservation Practice Standard 1050.

2.13 STONE TRACKING PAD

A. Stone Tracking Pads shall be established in accordance with Wisconsin DNR Conservation Practice Standard 1057.

B. The aggregate for tracking pads shall be 3 to 6 inch clear or washed stone. All material to be retained on a 3-inch sieve.

2.14 VEGETATIVE BUFFERS

A. Vegetative Buffers for Construction shall be established in accordance with Wisconsin DNR Conservation Practice Standard 1054.

B. Prior to land disturbance the perimeter of vegetative buffers shall be flagged or fenced to prevent equipment from creating ruts, compacting the soil and to prevent damage to existing vegetation.

C. Trees should not be cut down to establish a vegetative buffer. Other erosion control measures are preferred.

2.15 TEMPORARY SEDIMENT TRAPS

A. Temporary Sediment Traps shall conform with Wisconsin DNR Conservation Practice Standard 1063.

B. The stone outlet of a Sediment Trap shall consist of a stone section of embankment located at the discharge point. Stone shall consist of angular well graded 3 to 6 inch clear washed stone.

C. If filter fabric is indicated for the up-slope side of the stone outlet, a monofilament type fabric shall be used (such as WisDOT Type FF or equivalent).

2.16 TEMPORARY CONSTRUCTION SITE DIVERSION

A. Temporary Construction Site Diversions shall conform to Wisconsin DNR Conservation Practice Standard 1066.

2.17 DUST CONTROL

A. Dust Control measures shall be implemented in accordance with Wisconsin DNR Conservation Practice Standard 1068.

B. Asphalt and petroleum based products shall not be used for dust control.

C. Mulch or seed and mulch may be applied to protect exposed soil from wind erosion according to the provisions of WDNR Conservation Practice Standard 1058 Mulching for Construction Sites and 1059 Seeding for Construction Site Erosion Control.

D. Polymers may be used for dust control according to the provisions of WDNR Conservation Practice Standard 1050 Erosion Control Land Application of Polymers.

E. Tackifiers and Soil Stabilizers Type A – Products must be selected from the WisDOT Erosion Control PAL.

F. Solid board fences, snow fences, burlap fences, crate walls, bales of hay and similar material may be used to control air currents and blown soil.

2.18 CONSTRUCTION SITE DE-WATERING

A. Construction Site Dewatering activities shall be conducted in accordance with Wisconsin DNR Conservation Practice Standard 1061.

2.19 STORM DRAIN INLET PROTECTION

A. Storm Drain Inlet Protection shall conform Wisconsin DNR Conservation Practice Standard 1060.

B. All fabrics used as part of an inlet protection device must be selected from the list of approved fabrics certified for inlet protection, Geotextile Fabric, Type FF in the current edition of the WisDOT Product Acceptability List (PAL).

C. Inlet Protection Barriers include, but are not limited to, straw bales, sandbags, other material filled bags and socks, and stone weepers.

D. Manufactured bags, when used, shall conform to the standards below:
   1. Minimum Size 14 x 26 inches
   2. Grab Tensile strength of fabric, ASTM D-4632 = 95 lb. min.
   3. UV stability, ASTM D-4355 = 70 % min.
   4. Fabric shall be sewn together with double stitching.

E. Straw Bale installation shall conform to the criteria outlined in the WDNR Conservation Practice Standard (1055) Sediment Bale Barrier (Non-Channel).

F. Stone weeper installation shall conform to the criteria in WDNR Conservation Practice Standard (1063) Sediment Trap.

2.20 DITCH CHECK (CHANNEL)

A. Ditch Checks for erosion and sediment control in drainage ditches and channels shall conform Wisconsin DNR Conservation Practice Standard 1062.

B. Stone ditch checks shall be constructed of a well-graded angular stone, a D50 of 3 inch or greater, sometimes referred to as breaker run or shot rock.

C. Manufactured products listed in WisDOT's PAL are also acceptable for temporary ditch checks.

D. Silt fence and single rows of straw bales are not permitted.

2.21 LAND APPLICATION OF ANIONIC POLYACRYLAMIDE (POLYMERS, PAM).

A. Land Application of Anionic Polyacrylamide (PAM) shall conform Wisconsin DNR Conservation Practice Standard 1050.

B. Anionic PAM mixtures shall be environmentally benign, harmless to fish, aquatic organisms, wildlife, and plants. Anionic PAM mixtures shall be non-combustible.

C. Cationic PAM shall not be used at any level. Anionic PAM mixtures shall have ≤0.05% free acrylamide monomer by weight as established by the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA).

D. The manufacturer or supplier shall provide a product expiration date for anionic PAM mixtures based on product expiration date of PAM in pure form. PAM shall not be used if the expiration date will be reached prior to establishment of vegetation in areas where PAM is to be used.

E. Contractor shall store and mix polymer in accordance with manufacturer or supplier written instructions.

PART 3 EXECUTION

3.01 EROSION CONTROL REQUIREMENTS

A. The erosion control requirements specified in the project Storm Water Management Plan shall be adhered to at all times.

B. Temporary and permanent erosion control measures shall be performed by the Contractor. The Contractor shall control water pollution, erosion, and siltation through the use of intercepting embankments, berms, dikes, dams, settling basins, slope paving, ditch checks, riprap, mulches, erosion mats, seeding, sodding, plantings and other erosion control devices or methods.

C. The Contractor shall submit for approval his plan of operations for accomplishing temporary and permanent erosion control work relating to grubbing, grading, paving and other work which might create erosion.

D. The area of erosive land exposed to the elements by grubbing, excavation, borrow and fill operations at any one time shall be minimized to the maximum extent practicable and the duration of such exposure prior to final trimming, finishing and seeding or application of temporary erosion control measures shall be as short as practicable. Construction in and adjacent to rivers, streams, lakes, or other waterways shall be performed in such a manner as to avoid washing, sloughing or deposition of materials into such waterways which would obstruct or impair the flow thereof thus endangering the roadway or stream banks, or which would result in undue or avoidable contamination, pollution or siltation of such waterways.

E. The Owner or Designated Representative shall have full authority to suspend or limit grading and other operations pending adequate performance of such permanent erosion control measures as finish grading, topsoiling, mulching, matting and seeding and any temporary erosion control measures ordered by the Engineer.

F. Grubbing and grading operations shall be performed in proper sequence with other work to minimize erosion. Intercepting ditches or dikes shall be constructed as soon as practical after clearing and grubbing operations are completed and prior to or during the operations of excavating the cuts. Where erosion is likely to be a problem, the permanent erosion control measures shall follow immediately after the grading operations if conditions permit, unless the Engineer shall authorize temporary erosion control measures.

G. Water pumped from the site shall be treated by temporary sedimentations basins, grit chambers, sand filters, upslope chambers, hydro-cyclones, swirl concentrators, or other appropriate controls designed and used to remove total suspended solids (TSS) to 40 mg/l or less for the highest dewatering pumping rate. If the water is demonstrated to contain less than 40 mg/l TSS during dewatering operations, then no control is needed before discharge. Water may not be discharged in a manner that causes erosion of the site or receiving channels. Construction Site Dewatering activities shall be conducted in accordance with Wisconsin DNR Conservation Practice Standard 1061.

H. The Contractor shall take all possible precautions to prevent sediment from being tracked onto public or private roadways. Any sediment reaching a public or private road shall be removed by street cleaning (not flushing) before the end of each workday.

I. All storm drain or culvert inlets shall be protected with appropriate erosion control practices as identified in the appropriate Conservation Practice Standard. Channelized runoff from adjacent areas passing through the site shall be diverted around disturbed areas, if practical. Otherwise, the channel shall be protected. Sheet flow runoff from adjacent areas greater than 10,000 square feet in area shall also be diverted around disturbed areas unless shown to have resultant runoff velocities of less than 0.5 ft/sec across the disturbed area for one-year design storms having a duration of from 0.5 to 24 hours. Diverted runoff shall be conveyed in a manner that will not erode the conveyance and receiving channels.

J. All disturbed ground left inactive for seven (7) or more days shall be stabilized by seeding or sodding (only prior to October 15) or by mulching or covering, or other equivalent control measure.

K. For sites with more than 10 acres disturbed at one time, or if a channel originates in the disturbed area, one or more Temporary Sediment Traps shall be constructed in accordance with Wisconsin DNR Conservation Practice Standard 1063. The basin discharge rate shall also be sufficiently low as to not cause erosion along the discharge channel or the receiving water.

L. For sites with less than 10 acres disturbed at one time, sediment control fences, hay bales, or equivalent control measures shall be placed along all sideslope and downslope sides of the site. If a channel or area of concentrated runoff passes through the site, sediment control fences shall be placed along the channel edges to reduce sediment reaching the channel.

M. Any soil or dirt storage piles containing more than ten cubic yards of material should not be located with a downslope drainage length of less than 25 feet to a roadway or drainage channel. If remaining for more than seven (7) days, they shall be stabilized by mulching, vegetative cover, tarps, or other means. Erosion from piles which will be in existence for less than seven (7) days shall be controlled by placing hay bales or sediment control fence barriers around the pile. In-street utility repair or construction soil; or dirt storage piles located closer than 25 feet to a roadway or drainage channel must be covered with tarps or a suitable alternative control must be used if exposed for more than seven (7) days, and storm drain or culvert inlets must be protected with straw bales or other appropriate filtering barriers (CPS 1060).

3.02 TEMPORARY SEEDING

A. Seeding for Construction Sites shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1059.

B. Temporary Seeding (Cover Crop) - Areas needing protection during periods when permanent seeding is not applied shall be seeded with annual species for temporary protection. See table below for seeding rates of commonly used species. The residue from this crop may either be incorporated into the soil during seedbed preparation at the next permanent seeding period or left on the soil surface and the planting made as a no-till seeding.

Species	Lbs/Acre	Percent Purity
Oats	131[1]	98
Cereal Rye	131[2]	97
Winter wheat	131[2]	95
Annual Ryegrass	80[2]	97

1 Spring and summer seeding

2 Fall seeding

C. Permanent Seeding - Rates shall be based on pounds or ounces of Pure Live Seed (PLS) per acre. If a nurse crop is used in conjunction with permanent seeding, the nurse crop shall not hinder establishment of the permanent vegetation. A nurse crop shall be applied at 50% its temporary seeding rate when applied with permanent seed.

D. Inoculation - Legume seed shall be inoculated in accordance with the manufacturer's recommendations. Inoculants shall not be mixed with liquid fertilizer.

E. Sowing

1. Seed grasses and legumes no more than 1/4 inch deep. Distribute seed uniformly. Mixtures with low seeding rates require special care in sowing to achieve proper seed distribution.
2. Seed may be broadcast, drilled, or hydroseeded as appropriate for the site.
3. Seed when soil temperatures remain consistently above 53°F. Dormant seed when the soil temperature is consistently below 53°F (typically November 1st until snow cover). Seed shall not be applied on top of snow.

F. Turf seedlings must not be mowed until the stand is at least 6 inches tall. Do not mow closer than 3 inches during the first year of establishment.

G. Alternate plans must be submitted for approval.

3.03 APPLICATION OF STRAW OR HAY MULCH

A. Mulching for Construction Sites shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1058.

B. Application Rate:

1. Mulch shall cover a minimum of 80% of the soil surface for unseeded areas. For seeded areas, mulch shall be placed loose and open enough to allow some sunlight to penetrate and air to circulate but still cover a minimum of 70% of the soil surface.
2. Mulch shall be applied at a uniform rate of 1½ to 2 tons per acre for sites that are seeded, and 2 to 3 tons per acre for sites that are not seeded. This application results in a layer of ½ to 1½ inches thick for seeded sites, and 1½ to 3 inches thick for sites not seeded.
3. Wood chips or wood bark shall be applied at a rate of 6 to 9 tons per acre to achieve a minimum of 80% ground cover. This application should result in a layer of wood chips or wood bark ½ to 1½ inches thick.

C. In areas where mulch is to be placed over seed, mulch shall be placed within 24 hours of seeding.

D. Mulch Anchoring Methods - Anchoring of mulch shall be based on the type of mulch applied, site conditions, and accomplished by one of the following techniques:

1. Crimping: Immediately after spreading, the mulch shall be anchored by a mulch crimper or equivalent device consisting of a series of dull flat discs with notched edges spaced approximately 8 inches apart. The mulch shall be impressed in the soil to a depth of 1 to 3 inches.
2. Polypropylene Plastic, or Biodegradable Netting: Apply plastic netting over mulch application and staple according to manufacturer's recommendations.
3. Tackifier: Tackifier shall be sprayed in conjunction with mulch or immediately after the mulch has been placed. Tackifiers must be selected from those that meet the WisDOT Erosion Control Product Acceptability List (PAL). Asphalt based products shall not be applied.
   a. The tackifiers shall be applied at the following minimum application rates per acre:

1) Latex-Base: mix 15 gallons of adhesive (or the manufacturer's recommended rate which ever is greater) and a minimum of 250 pounds of recycled newsprint (pulp) as a tracer with 375 gallons of water.
2) Guar Gum: mix 50 pounds of dry adhesive (or the manufacturer's recommended rate which ever is greater) and a minimum of 250 pounds of recycled newsprint (pulp) as tracer with 1,300 gallons of water.
3) Other Tackifiers: (Hydrophilic Polymers) mix 100 pounds of dry adhesive (or the manufacturer's recommended rate which ever is greater) and a minimum of 250 pounds of recycled newsprint (pulp) as a tracer with 1,300 gallons of water.

3.04 PLACING EROSION MAT

A. Installation instructions shall be supplied by the manufacturer. The Contractor shall install the mat in accordance with the manufacturer's recommendations and in accordance with Section 628.2 of the State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, and the State of Wisconsin, Department of Transportation general requirements for erosion mat except as may be modified herein.

B. Erosion control revegetative mats shall be installed after all topsoiling, fertilizing, liming and seeding is complete.

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

D. The mat shall be unrolled and draped loosely, without stretching, so that continuous ground contact is maintained. In ditches, mat shall be unrolled and applied parallel to the direction of drainage. On slopes, mat shall be applied parallel to the slope direction.

E. Turf-reinforcement mat shall be installed in conjunction with the topsoiling operation and shall be followed by Erosion Control Revegetative Mat installation.

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

G. In channels and on slopes, each upslope and each downslope end of each piece of mat shall be placed in a 4-inch trench, stapled on 12-inch centers, backfilled and tamped. Where one roll ends and second roll starts, the upslope piece shall be brought over the end of the downslope roll so that there is a 12 inch overlap, placed in a 4 inch trench, stapled on 12 inch centers, backfilled and tamped. In channels, erosion mats shall extend for whichever is greater: upslope one-foot minimum vertically from the ditch bottom or 6 inches higher than the design flow depth.

H. On slopes, where two or more widths of mat are applied, the two edges shall be overlapped according to the manufacturer's installation instructions and stapled at 18 to 24 inch intervals along the exposed edge of the lap joint. The body of the mat shall be stapled in a grid pattern with staples 3 feet on center each way.

I. Where heavy concentrations of water or extremely erodible soil conditions exist, as noted on the contract drawings, erosion checks shall be installed at intervals of 50 feet, or less. Such a check shall consist of a 4-inch deep trench perpendicular to the flow direction across the entire width of the fabric. The mat shall be stapled at 9-inch intervals along the bottom of the trench across the entire width of the mat. The trench shall then be backfilled and tamped.

J. If anchoring devices become loosened, or if any fabric loosens, is torn or undermined, repairs shall be made immediately without additional compensation.

K. Erosion mat when used in conjunction with fertilizing and seeding done for surface restoration, shall be installed immediately after fertilizing and seeding operations have been completed. Straw or hay mulch shall not be used under the fabric.

L. Erosion mat shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

1. If there are signs of rilling under the mat, install more staples or more frequent anchoring trenches. If rilling becomes severe enough to prevent establishment of vegetation, remove the section of mat where the damage has occurred. Fill the eroded area with topsoil, compact, reseed and replace the section of mat, trenching and overlapping ends per manufacturer's recommendations. Additional staking shall be provided where rilling was filled.
2. If the reinforcing plastic netting has separated from the mat, remove the plastic and if necessary replace the mat.
3. Maintenance shall be completed as soon as possible with consideration to site conditions.

3.05 VEGETATIVE BUFFERS

A. Vegetative Buffers for Construction shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1054.

B. Trees should not be cut down to establish a vegetative buffer.

C. A stand of dense vegetation shall be maintained to a height of 3 – 12 inches.

D. Vegetative buffers shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period. Vegetative buffers shall be inspected for proper distribution of flows, sediment accumulation and signs of rill formation.

E. If the vegetative buffer becomes silt covered, contains rills, or is otherwise rendered ineffective, other perimeter sediment control measures shall be installed. Eroded areas shall be repaired and stabilized. Repair shall be completed as soon as possible with consideration to site conditions.

3.06 TEMPORARY SOD PLACEMENT

A. The Contractor shall place sod with edges in close contact and with joints staggered. Sod placement on slopes shall commence at the bottom of the slope, and the rows shall be laid perpendicular to the slope. The edge of the sod at the tops of slopes shall be turned slightly under, and a layer of soil shall be compacted over the edge to direct surface drainage over the edge onto the top of the sod. Sod placement in areas other than on slopes shall be made so that the top sod surface is flush with adjoining surfaces.

B. On slopes steeper than 4:1 horizontal to vertical, the Contractor shall stake the sod with split cedar shingles, or other equally effective stakes, spaced from 18 to 36 inches apart along the longitudinal axis of the sod strip. These stakes shall be placed near the top edge of the sod strip and shall be driven flush with the sod.

C. After the sod is placed, it shall be rolled or firmly tamped to press the sod onto the underlying soil. The Contractor shall, at the end of the day in which the sod is laid, thoroughly soak all sodded areas by sprinkling them with water.

D. Sod shall be maintained in a moist, growing condition. The Contractor shall repair all areas damaged by erosion or traffic of any kind.

3.07 PLACING HAY BALE BARRIERS

A. Straw Bale (Sediment Bale Barriers) shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1055.

B. Sufficient bales shall be on the site to create the necessary barriers prior to the start of groundbreaking operations. The bales shall be stacked and covered with plastic sheeting until required for use.

C. At a minimum, sediment bale barriers shall be placed in a single row, lengthwise on the contour, with the ends of adjacent sediment bale barriers tightly abutting one another. The holes between bales shall be

chinked (filled by wedging) with straw, hay or equivalent material to prevent water from escaping between the bales.

D. The maximum allowable slope lengths contributing runoff to a sediment bale barrier are specified below:

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

E. Sediment bale barriers shall not be placed perpendicular to the contour.

F. The end of the sediment bale barrier shall be extended upslope to prevent water from flowing around the barrier ends.

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

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

I. At least two wood stakes, “T” or “U” steel posts, or 1/2 inch rebar driven through at equidistance along the centerline of the barrier shall securely anchor each bale. The first stake in each bale shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven a minimum 12-inches into the ground to securely anchor the sediment bale barriers.

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

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

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

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

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

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

3.08 CONSTRUCTION OF SEDIMENT CONTROL FENCE (SILT FENCE)

A. Silt Fence shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1056.

B. When installed as a stand-alone practice on a slope, silt fence shall be placed on the contour. The parallel spacing shall not exceed the maximum slope lengths for the appropriate slope as specified:

Slope	Fence Spacing
< 2%	100 feet
2 to 5%	75 feet
5 to 10%	50 feet
10 to 33%	25 feet
> 33%	20 feet
> 50%	Not Permitted

C. Silt fences shall not be placed perpendicular to the contour.

D. The ends of the fence shall be extended upslope to prevent water from flowing around the ends of the fence.

E. When attached to wooden posts the silt fence fabric shall be stapled, using at least 0.5-inch staples, to the upslope side of the posts in at least 3 places.

F. When attached to steel supports the silt fence fabric shall be attached in at least three places on the upslope side with 50 pound plastic tie straps or wire fasteners. To prevent damage to the fabric from fastener, the protruding ends shall be pointed away from the fabric.

G. The maximum spacing of posts for nonwoven silt fence shall be 3 feet and for woven fabric 8 feet.

H. Where joints are necessary, each end of the fabric shall be securely fastened to a post. The posts shall then be wrapped around each other to produce a stable, secure joint or shall be overlapped the distance between two posts.

I. On the terminal ends of silt fence the fabric shall be wrapped around the post such that the staples are not visible.

J. A minimum of 20 inches of the post shall extend into the ground after installation.

K. Anchoring – Silt fence shall be anchored by spreading at least 8 inches of the fabric in a 4 inch wide by 6 inch deep trench, or 6 inch deep V-trench on the upslope side of the fence. The trench shall be backfilled and compacted. Trenches shall not be excavated wider and deeper than necessary for proper installation.

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

M. Silt fences shall at a minimum be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.

N. Damaged or decomposed fences, undercutting, or flow channels around the end of barriers shall be repaired or corrected.

O. Sediment shall be properly disposed of once the deposits reach 1/2 the height of the fence.

3.09 STONE TRACKING PAD

A. Stone Tracking Pads shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1057.

B. The tracking pad shall be installed prior to any traffic leaving the site.

C. The aggregate shall be placed in a layer at least 12 inches thick. On sites with a high water table, or where saturated conditions are expected during the life of the practice, stone tracking pads shall be underlain with a WisDOT Type R geotextile fabric to prevent migration of underlying soil into the stone.

D. Tracking pads and tire washing stations shall, at a minimum, be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

E. The tracking pad performance shall be maintained by scraping or top-dressing with additional aggregate.

F. A minimum 12-inch thick pad shall be maintained.

3.10 STORM DRAIN INLET PROTECTION

A. Storm Drain Inlet Protection shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1060.

B. The contributing drainage area to the inlet protection device shall be one acre or less. In instances were a larger contributing drainage area exists, runoff shall be routed through a properly designed sediment trapping or settling device upstream of inlet.

C. Other than Type D inlet protection devices, no gaps shall be left in the material used that would allow the flow of water to bypass the inlet protection device.

D. Filter Fabric Barrier Criteria - See Inlet Protection Detail
1. Inlet protection Type A devices shall be utilized around inlets and unpaved areas until permanent stabilization methods have been established. Type A devices shall be utilized on inlets prior to installation of curb and gutter or pavement, and where safety considerations are not compromised on the site.
2. Type B shall be utilized after the casting and grate are in place.
3. Type D shall be utilized in areas where other types of inlet protection are identified as incompatible with roadway and traffic conditions, causing possible safety hazards when ponding occurs at the inlet. Type D shall only be used after castings are in place on top of the inlet boxes.
4. Type D inlet protection shall conform to the standard drawing as shown in the contract drawings. There shall be a three-inch space between the bag and the sides of the inlet to prevent the inlet sides from blocking the overflow; and shall only be used in inlets deeper than 30 inches from the top of grate to bottom of the inlet. If such clearance is not available, cinch or tie the sides of the bag (with rope or ties) to provide clearance.

E. Criteria Applicable to the Post-Paving/Curbing Phase of Construction
1. Inlet protection Types B, C, and D are applicable to post paving construction. See Inlet Protection Detail.
   a. Type B shall be utilized on inlets without curb box.
   b. Type C shall be utilized on street inlets with curb heads. A 1½ inch x 3½ inch (37 mm by 87 mm) minimum, piece of wood shall be wrapped and secured in the fabric and placed in front of the curb head as shown in the contract drawings. The wood shall not block the entire opening of the curb box and be secured to the grate with wire or plastic ties.
   c. Type D.

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

G. Inlet protection shall be at a minimum inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

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

I. Any material falling into the inlet shall be removed.

3.11 DITCH CHECK (CHANNEL)

A. Ditch Checks for erosion and sediment control in drainage ditches and channels shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1062.

B. Ditch checks shall be utilized during rough grading and shall be removed once the final grading and channel stabilization is applied, unless intended to be part of a permanent storm water management plan.

C. Channel erosion mat or other nonerodible materials shall be placed at the base of a ditch check, and extended a minimum of 6 feet, to prevent scour and washing out the toe of the ditch check. DNR Conservation Practice Channel Erosion Mat (1053) contains criteria for the placement of erosion mat in this location.

D. Stone ditch checks may be underlain by a nonwoven geotextile fabric to ease installation and removal. If the geotextile fabric is extended, it can serve purpose specified in item 3.11 C above.

E. Chink or seal stone and rock ditch checks to minimize the flow through the ditch check.

F. For added stability, the base of a stone or rock ditch check shall be keyed into the soil to a depth of 6-inches.

G. Ditch checks shall, at a minimum, be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.

H. Unless incorporated into a permanent storm water management system, ditch checks shall be removed once the final grading and channel stabilization is applied.

I. Maintenance shall be completed as soon as possible with consideration to site conditions.

3.12 TEMPORARY SEDIMENT TRAPS

A. Temporary Sediment Traps shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1063.

B. Sediment traps shall be constructed prior to disturbance of up-slope areas and placed so they function during all phases of construction.

C. The depth of the sediment trap measured from the sediment trap bottom to the invert of the stone outlet, shall be at least three feet to minimize re-suspension and provide storage for sediment.

D. The sediment trap shall have a length to width ratio of at least 2:1. The position of the outlet to the inlet shall be as such to minimize short-circuiting of the water flow path.

E. Side slopes shall be no steeper than 2:1.

F. Embankments of temporary sediment traps shall not exceed five feet in height measured from the downstream toe of the embankment to the top of the embankment. Construct embankments with a minimum top width of four feet, and side slopes of 2:1 or flatter. Earthen embankments shall be compacted.

G. Sediment traps shall be constructed with both a principal and emergency spillway. The stone outlet of a sediment trap shall consist of a stone section of embankment (stone outlet) located at the discharge point. The stone outlet section provides a means of dewatering the basin back to the top of the permanent storage between storm events, and also serves as a non-erosive emergency spillway for larger flow events.

H. The stone outlet shall have a minimum top width of 2 feet and a maximum side-slope of 2:1.

I. The stone outlet shall be protected from undercutting by excavating a keyway trench across the stone foundation and up the sides to the height of the outlet.

J. Sediment Traps shall, at a minimum, be inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period. Sediment may need to be removed more frequently.

K. Deposits of sediment shall be removed when they reach a depth of one foot.

L. If the outlet becomes clogged it shall be cleaned to restore flow capacity.

M. Maintenance shall be completed as soon as possible with consideration given to site conditions.

N. Sediment traps shall be removed and the location stabilized after the disturbed area draining to the sediment trap is stabilized and no longer susceptible to erosion.

3.13 TEMPORARY CONSTRUCTION SITE DIVERSION

A. Temporary Construction Site Diversions shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1066.

B. The minimum berm cross section shall have side slopes of 2:1 (horizontal:vertical) or flatter, a minimum top width of two feet and a minimum height of 1.5 feet.

C. Diversions that are to serve longer than 30 days shall be stabilized as soon as they are constructed.

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

E. Maintenance shall be completed as soon as possible with consideration to site conditions.

F. Accumulated sediment shall be removed when it reaches one half the height of the diversion berm.

G. Diversions shall be removed and the area stabilized according to construction contract drawings.

3.14 DUST CONTROL

A. Dust Control measures shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1068.

B. Polymers may be used in areas that do not receive vehicle traffic. Dry applied polymers must be initially watered for activation to be effective for dust control. Polymers shall be utilized in accordance with the provisions of WDNR Conservation Practice Standard 1050 Erosion Control Land Application of Polymers.

C. Tackifiers and Soil Stabilizers Type A – Products must be installed at rates conforming to the WisDOT Erosion Control PAL.

D. Chlorides shall be applied according to the most recent version of the WisDOT Standard Specifications for Highway and Bridge Construction.

E. Barriers - Barriers shall be placed at right angles to prevailing wind currents at intervals of about 15 times the barrier height.

F. Areas that have dust control practices shall at a minimum be inspected daily.

3.15 LAND APPLICATION OF ANIONIC POLYACRYLAMIDE (POLYMERS).

A. Land Application of Anionic Polyacrylamide (polymers) shall be installed and maintained in accordance with Wisconsin DNR Conservation Practice Standard 1050.

B. Application rates shall not exceed manufacturer's written application rate recommendations that shall not exceed the WDNR use restrictions.

C. Maximum application rates, in parts per million (ppm or mg/L or mg/kg), shall be determined by multiplying 1.4 by the number of pounds applied per acre. This number shall be less than or equal to the WDNR use restriction. Repeated applications of anionic PAM mixtures may be applied, if necessary, to ensure adequate effectiveness.

D. The application method shall provide uniform coverage to the target area and avoid drift to non-target areas.

E. When used on bare soil, without seed or mulch, anionic PAM mixtures shall be used on slopes 2.5:1 or flatter.

F. Anionic PAM mixtures shall not be applied to channel bottoms.

G. The applicator of anionic PAM mixture shall document, at the time of application, the following: name of applicator, application rate per acre, date applied, product type, weather conditions during application, and method of application. Copies of this documentation shall be entered into the contractor's monitoring log or project diary and made available upon request.

H. Unused liquid anionic PAM mixtures shall be minimized. Excess material shall not be applied at a rate greater than the maximum application rate. Disposal shall not occur in storm water conveyance systems (i.e., storm sewer manholes, storm sewer inlets, ditches, and culverts).

I. PAM shall not be used within 30 feet of surface waters of the state.

J. Maintenance will consist of reapplying anionic PAM mixtures to disturbed areas, including high use traffic areas, which interfere in the performance of this practice.

K. AnionicPAM mixtures should be reapplied in areas where wind or rill erosion is apparent and whenever an area has been graded, driven upon, or otherwise disturbed since the anionic PAM mixture was last applied.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Erosion and sedimentation controls shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 EROSION AND SEDIMENTATION CONTROLS

A. Erosion and Sedimentation Controls, Lump Sum. When so provided, payment for erosion and sedimentation controls shall be made at the contract lump sum price bid.

B. Erosion and Sedimentation Controls, Inclusive. When no quantity is provided, erosion and sedimentation controls shall be considered inclusive to payment for contract work related to the associated construction.

END OF SECTION

SECTION 31 37 00
RIPRAP

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work covered under this section shall consist of furnishing all material, equipment, and labor required to execute the riprapping for this project and in accordance with the provisions of Section 606 of the Standard Specifications.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Geosynthetics for Earthwork - Division 31

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 MATERIALS

A. Provide riprap stone grade (i.e., light riprap, medium riprap, heavy riprap, extra-heavy riprap) as indicated in the Special Procedures - Division 01 or as shown on the contract drawings, and in conformance with Section 606 of the Standard Specifications. Stone shall be durable field or quarry stone approved by the Engineer prior to placing. It shall be sound, hard, dense, resistant to the action of air and water, and free from seams, cracks or other structural defects.

B. Provide riprap grout as indicated in the Special Procedures - Division 01 or as shown on the contract drawings, and in conformance with Section 606 of the Standard Specifications.

PART 3 EXECUTION

A. The bed for the riprap shall be prepared by excavating, shaping the slopes and constructing the toe for riprap installation. Restore the surface of adjacent work following riprap placement, and dispose of surplus material.

3.02 PLACING LIGHT RIPRAP

A. Stone placed above the waterline shall be placed by hand. It shall be laid with close, broken joints and shall be firmly bedded into the slope and against the adjoining stones. The stones shall be laid perpendicular to the slope with ends in contact. The stone shall be thoroughly compacted as construction progresses and the finished surface shall present an even, tight surface. The larger stone shall be placed in the lower courses. Interstices between stones shall be chinked with spalls firmly rammed into place. Unless otherwise provided,

light riprap shall be at least 12 inches in thickness, measured perpendicular to the slope. Use Type R geotextile fabric under stone. Stone shall not be placed against or in contact with any concrete surface prior to the completion of the concrete's curing and protection period

3.03 PLACING MEDIUM, HEAVY AND EXTRA-HEAVY RIPRAP

A. Stone may be placed by any mechanical means that will produce a completed job within reasonable tolerances of the typical section shown on the contract drawings. Unless otherwise provided on the contract drawings, medium ripap shall not be less than 18 inches in thickness, heavy riprap shall be not less than 24 inches in thickness and extra-heavy riprap shall not be less than 30 inches in thickness, all measured perpendicular to the slope. Hand work shall be limited to the amount necessary to fill large voids or to correct segregated areas. Use Type HR geotextile fabric under stone. Stone shall not be placed against or in contact with any concrete surface prior to the completion of the concrete's curing and protection period.

3.04 PLACING GROUTED RIPRAP

A. Place stone as indicated above in 3.02 or 3.03, and fill the voids between stones with riprap grout. Use an adequate amount of riprap grout to completely fill the voids, but leave the stone face surface exposed.

B. Install riprap grout from bottom to top and then sweep the surface with a stiff broom. Upon completion of the riprap grouting, cure the surface in conformance with the requirements of Section 606 of the Standard Specifications.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Riprap shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 RIPRAP

A. Riprap (Grade), Cubic Yard. Riprap will be measured by the cubic yard acceptably completed, measured as the volume within the limiting dimensions the contract designates or the engineer establishes in the field. Payment for riprap is full compensation for preparing the bed, providing and placing riprap, restoring adjacent work, and disposing of surplus material.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE AND SUBBASE

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work covered under this section shall consist of furnishing all material equipment and labor required to construct a dense compacted base course composed of one or more courses or layers of coarse aggregate, fine aggregate and binder or filler blended to produce an intimate mixture of the required gradation and stability, in accordance with Sections 301 and 305 of the State of Wisconsin, Department of Transportation, Standard Specifications. This work shall also consist of a furnishing all material equipment and labor required to place breaker run and select crushed material for this project in accordance with Sections 301, 311 and 312 of the State of Wisconsin, Department of Transportation, Standard Specifications.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Subgrade Preparation - Division 31

C. Salvage Existing Pavement and Base - Division 32

1.05 SUBMITTALS (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 DENSE GRADED BASE

A. Materials furnished and used in this work shall consist of coarse and fine aggregate with sufficient binder to produce a stable base for the surfacing. Base materials shall be free from vegetative or organic matter, shale and lumps of clay. Dense graded base shall be crushed stone or crushed gravel conforming to the gradations required in Section 305.2.2.1 of the State of Wisconsin, Department of Transportation, Standard Specifications, unless indicated otherwise in Special Procedures - Division 01 or on the contract drawings.

2.02 BREAKER RUN

A. Breaker Run shall be used when shown on typical sections or called for in Special Procedures - Division 01. Breaker run shall be free of organic matter, shale and lumps of clay. The material shall comply with Section 311 of the State of Wisconsin, Department of Transportation, Standard Specifications. If the cross section thickness of breaker run is less than 12 inches, the gradation for breaker run shall conform to 3-inch dense graded base as per Section 305.2.2.1 of the State of Wisconsin, Department of Transportation, Standard Specifications.

2.03 SELECT CRUSHED MATERIAL

A. Select Crushed Material shall be used when shown on typical sections or called for in Special Procedures - Division 01. Select Crushed shall be free of organic matter, shale and lumps of clay. The material shall comply with Section 312 of the State of Wisconsin, Department of Transportation, Standard Specifications.

PART 3 EXECUTION

3.01 DENSE GRADED BASE

A. Each layer of base shall be compacted over the entire area per Section 301.3 and 305.3 of the State of Wisconsin, Department of Transportation, Standard Specifications.

B. Each layer shall also be compacted and consolidated to the degree that there will be no appreciable displacement of it laterally or longitudinally under compaction equipment or a fully loaded tandem dump truck.

C. Where aggregate base is being placed on top of existing gravel, the existing gravel shall be scarified to a depth of three inches prior to placement of additional base.

D. Aggregate base course beneath and within 10 feet of a structure shall be compacted to 95 percent maximum dry density per modified proctor (ASTM D1557).

E. The aggregate base shall be graded, shaped and rolled to the finished cross section template shown on the contract drawings and to the satisfaction of the Engineer.

3.02 BREAKER RUN

A. Each layer of breaker run shall be compacted over the entire area per Section 301.3 and 305.3.2.3 of the State of Wisconsin, Department of Transportation, Standard Specifications.

B. Each layer shall also be compacted and consolidated to the degree that there will be no appreciable displacement of it laterally or longitudinally under compaction equipment or a fully loaded tandem dump truck.

C. The breaker run shall be graded, shaped and rolled to the finished cross section template shown on the contract drawings and to the satisfaction of the Engineer.

D. Breaker run shall be classified as 3" - 6" Breaker.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Aggregate base course shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 DENSE GRADED BASE

A. Dense Graded Base, Cubic Yard. Measurement for dense graded base will be per cubic yard installed, computed from the square yards measured in the field multiplied by the compacted thickness stated on the contract drawings or in the Special Procedures – Division 01. Payment will be made at the contract unit price bid per cubic yard in place for dense graded base installed.

4.03 BREAKER RUN

A. Breaker Run, Cubic Yards. Measurement for breaker run shall be per cubic yard installed as measured in the field. The breaker run shall be installed and compacted to the depth stated on the contract drawings or in Special Procedures - Division 01. Payment shall be made at the contract unit price bid per cubic yard for breaker run installed and compacted.

4.04 SELECT CRUSHED MATERIAL

A. Select Crushed Material, Cubic Yards. Measurement for select crushed material shall be per cubic yard installed as measured in the field. The select crushed material shall be installed and compacted to the depth stated on the contract drawings or in Special Procedures - Division 01. Payment shall be made at the contract unit price bid per cubic yard for select crushed material installed and compacted.

END OF SECTION

SECTION 32 91 19.13
TOPSOIL PLACEMENT AND GRADING

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work under this section shall cover furnishing all material, equipment, and labor required to salvage and/or furnish, haul, place, and prepare topsoil for this project in accordance with Section 625 of the State of Wisconsin, Department of Transportation Standard Specifications.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Erosion and Sedimentation Controls - Division 31

C. Grading - Division 31

D. Subgrade Preparation - Division 31

E. Seeding - Division 32

F. Sodding - Division 32

1.05 SUBMITTALS

A. Submit a sample of the topsoil material prior to placement. Topsoil material shall be approved by the Owner or Engineer prior to placing on the project.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 TOPSOIL

2.02 Specifier to choose A, B and/or C (screened and/or shredded recommended for urban projects with lawn areas, use non-screened/shredded for non-urban projects)

A. Topsoil shall be screened and conform to Section 625 of the State of Wisconsin, Department of Transportation, Standard Specifications. A minimum of 100% of the topsoil shall pass through the one-inch sieve (25 mm) and 90% shall pass the No. 10 (2.00 mm) sieve.

2.03 SALVAGED TOPSOIL

A. Topsoil salvaged from the project site may be used to replace planned quantities of topsoil.

B. Salvaged topsoil shall be screened and conform to Section 625 of the State of Wisconsin, Department of Transportation, Standard Specifications. A minimum of 100% of the topsoil shall pass through the one-inch sieve (25 mm) and 90% shall pass the No. 10 (2.00 mm) sieve.

PART 3 EXECUTION

3.01 PRESERVATION OF TREES AND SHRUBS

A. Trees and shrubs to be preserved shall be thoroughly protected from scarring or other injury during placement and grading operations. Excavation operations shall not disturb the original ground around trees within a distance of one foot or twice the diameter of the tree, whichever is greater. Exposed roots resulting from excavation shall be cut cleanly and covered with humus-bearing soil.

B. When necessary or required by the Contract Documents, trees or shrubs around which embankment is placed shall be protected by tree wells built in accordance with Detailed Drawings or as laid out in the field by the Owner or Engineer.

3.02 REMOVING AND SALVAGING TOPSOIL

A. General. Topsoil shall be stripped and salvaged or removed in accordance with Subsection 625.3 of the State of Wisconsin, Department of Transportation Standard Specifications.

B. Salvaged Topsoil. Topsoil shall be stripped to full depth, or a minimum depth of 6 inches (whichever is less), in all areas of cut or fill, except within proposed roadway limits topsoil shall be stripped full depth. Stockpile topsoil in storage piles. Construct storage piles to freely drain surface water. Cover or sprinkle water on storage piles if required to prevent windblown dust. Any appreciable volume left in the stockpile after properly placing shall become the property of the Owner and Transported to the Village Shop or other location as direction by Village Public Works Staff. In any event, the pile shall be smoothed and seeded. All piles, which are to be left for seven or more days, shall be stabilized as indicated in the Erosion and Sedimentation Controls - Division 31.

3.03 PLACEMENT AND GRADING

A. General. Topsoil shall be placed in accordance with Subsection 625.3 of the State of Wisconsin, Department of Transportation Standard Specifications.

B. Grading. The Contractor shall grade in back of the curb or walk to provide a smooth surface and a 4:1 maximum slope unless shown otherwise on the plan. Graded surfaces shall be covered with topsoil to finished grade as shown on the typical sections.

C. Utility Adjustment. The Contractor shall adjust all valve boxes, manhole frames, and other utility appurtenances to within 1 inch of the final grade as shown on the contract drawings or as staked in the field by the Engineer.

D. All areas disturbed by the Contractor's activities and intended for seeding or sodding shall be topsoiled to the depth of 4-inches unless shown otherwise on the Contract Drawings or specified in Special Procedures - Division 01.

E. All areas disturbed by the Contractor's activities and intended for cultivation of vegetation other than turf shall be topsoiled to the depth of the original topsoil, unless shown otherwise in the Contract Drawings.

F. Construction in and adjacent to flowing streams shall be performed to avoid washing, sloughing or deposition of materials into the channel which may obstruct or impair stream flow, or which may result in contamination and/or silting of the stream.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Topsoil placement and grading shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. No measurement will be made of corrective actions necessary to address erosion and/or settlement of topsoil.

C. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 SALVAGED TOPSOIL

A. Salvaged Topsoil. Where salvaged topsoil from the project site is used to replace planned quantities of topsoil, no additional payment shall be made for removal and processing of salvaged topsoil. All work to remove, stockpile, process, place and grade salvaged topsoil shall be considered inclusive to Topsoil Placement and Grading.

4.03 TOPSOIL PLACEMENT AND GRADING

A. Topsoil Placement and Grading, Square Yard. Measurement for topsoil placement and grading will be per square yard installed to the depth specified within the limits of construction designated on the plans, or in the contract, or as directed by the Engineer. Payment shall be made at the contract unit price bid per square yard.

END OF SECTION

SECTION 32 92 19
SEEDING

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work covered under this section shall consist of furnishing all material, equipment, and labor required to execute the seeding for this project. All areas disturbed by the construction and not covered with pavement, aggregate base course, sod, or other structures shall be seeded, fertilized and mulched.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Submittals - Division 01

C. Subgrade Preparation - Division 31

D. Trenching and Backfilling - Division 31

E. Erosion and Sedimentation Controls - Division 31

F. Topsoil Placement and Grading - Division 32

G. Sodding - Division 32

1.05 SUBMITTALS

A. Contractor shall submit such product literature and catalog cuts of materials to be supplied to relate these materials to these specifications. Information shall be in conformance with requirements of Submittals - Division 01 of these specifications.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 SEED

A. Seed shall conform to Section 630 of the State of Wisconsin, Department of Transportation, Standard Specifications.
   1. Mixture. Unless specified otherwise, the Contractor utilize the following seed mixtures:
      a. Lawn areas shall be No. 40
      b. Slope areas shall be No. 20
      c. Native areas and pond slopes shall be No. 75 unless otherwise specified.
   2. Nurse crop shall be annual oats prior to September 1. Nurse crop shall be winter wheat or annual ryegrass for the remainder of the year.

2.02 FERTILIZER

A. Fertilizer shall contain the following percentages by weight:

Nitrogen	(N)	20%
Phosphorus	(P)	10%
Potash	(K)	10%

B. If local ordinances restrict the use of phosphorus in fertilizer, the local restrictions shall supercede the above percentages.

2.03 MULCH

A. Mulching shall consist of any straw, hay, wood excelsior fiber or other suitable material of a similar nature, which is substantially free of noxious weed seeds and objectionable foreign material.

2.04 WATER

A. Water shall be clean and free of impurities or substances that might injure the seed or grass.

PART 3 EXECUTION

3.01 SEEDING

A. Seeding shall be done in conformance with Subsection 630.3 of the State of Wisconsin, Department of Transportation, Standard Specifications. Seed shall be sown at a rate of four pounds per 1,000 square feet unless otherwise specified.

B. A nurse crop shall be sown with the seeding at a rate of four pound per 1000 square feet of area.

3.02 FERTILIZER

A. Apply fertilizer in conformance with Section 629 of the State of Wisconsin, Department of Transportation, Standard Specifications.

B. Deliver fertilizer to site in original unopened containers showing manufacturer's name, guaranteed analysis and weight. Store in a weatherproof location and use only when dry and free flowing. Apply fertilizer at rate of 10 pounds per 1000 square feet and evenly mix into top 2 inches of topsoil.

C. At the Contractor's option, the Contractor may perform soil tests and apply fertilizer based on the results.

3.03 MULCHING

A. This work shall consist of furnishing, placing, and anchoring a mulch cover over seeded areas.

B. Construction shall be done in conformance with Section 627 of the State of Wisconsin, Department of Transportation, Standard Specifications.

C. In existing developed areas, mulching shall be done in such a manner to prevent dust and mulch from being deposited on non-seeded areas. Acceptable methods are by hand or a small chopper/mulcher with a controlled discharge.

3.04 ACCEPTANCE

A. The work will be considered acceptable after a 3-inch uniform stand of grass is attained and all gullies, rivulets, and washouts have been repaired to the satisfaction of the Engineer. The Contractor shall request the Engineer's inspection and acceptance will be made in writing when the above conditions have been complied with. Contractor shall make all corrective actions necessary to attain acceptance.

3.05 WATERING

A. If weather conditions are not suitable establishing turf, the seeded areas shall be watered twice weekly. Water shall be applied uniformly and in such a manner as not to waterlog the topsoil, dislodge the seed, or cause erosion.

B. If water is provided by a water utility, the Contract shall maintain a record of the amount of water obtained and provide it to the utility.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Seeding shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. No measurement will be made of corrective actions necessary to address erosion or non-establishment of vegetation.

C. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 SEEDING

A. Seeding, Square Yard. Payment shall be made at the contract unit price bid per square yard for seeding installed. Measurement shall be per square yard installed as measured in the field.

4.03 WATERING

A. Watering, Inclusive. When no quantity is provided, payment for watering shall be considered inclusive to payment for seeding.

END OF SECTION

SECTION 33 41 13
PUBLIC STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 01 shall govern work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. American Association of State Highway and Transportation Officials (AASHTO), Standard Specifications, Latest Edition.
   2. American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards, Current Edition.
   3. State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, Current Edition at time of bid opening.

1.03 DESCRIPTION OF WORK

A. The work covered under this section shall consist of furnishing all material, equipment, and labor required to install the public storm utility drainage piping for this project.

1.04 RELATED WORK ELSEWHERE

A. Procurement and Contracting Requirements - Division 00 (All Sections)

B. Trenching and Backfilling - Division 31

1.05 SUBMITTALS

A. Contractor shall submit such product literature and catalog cuts of materials to be supplied to relate these materials to the specifications. Information shall be in conformance with requirements of Submittals - Division 01 of these specifications.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

PART 2 PRODUCTS AND MATERIALS

2.01 CORRUGATED METAL PIPE (CMP)

A. Steel corrugated metal pipe and steel apron endwalls shall conform to the requirements of Sections 520 and 521 of the State of Wisconsin, Department of Transportation, Standard Specifications. All endwalls 24-inches and larger in diameter require trash guard.

B. Aluminum corrugated metal pipe and aluminum apron endwalls shall conform to the requirements of Sections 520 and 525 of the State of Wisconsin, Department of Transportation, Standard Specifications. All endwalls 24-inches and larger in diameter require trash guard.

2.02 HIGH DENSITY POLYETHYLENE PIPE (HDPE)

A. High density polyethylene pipe shall conform to the requirements of Section 530 of the State of Wisconsin, Department of Transportation Standard Specifications. Pipes which are between 42 inch diameter and 48 inch diameter shall meet the requirements of AASHTO M252 and M294, Type D.

B. Couplings and fittings for 4-36 inch pipe shall be suitable for the specific project application and as recommended by the pipe manufacturer. The joint for 42-48 inch pipe shall consist of a bell and spigot, integrally welded to the barrel of the pipe, utilizing a suitable profile gasket located on the spigot end.

1. The fittings shall not reduce or impair the overall integrity or function of the pipe line. Fittings may be either molded or fabricated. Common corrugated fittings include in-line joint fittings, such as couplers and reducers, and branch or complimentary assembly fittings such as tees, wyes, and end caps. These fittings may be installed by various methods, such as snap-on, screw-on, bell and spigot, and wrap around.
2. Couplings shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints.
3. Only fittings supplied or recommended by the pipe manufacturer shall be used. Where designated on the contract drawings, a neoprene or rubber gasket shall be supplied.

PART 3 EXECUTION

3.01 GENERAL

A. Construction of the public storm utility drainage piping shall include all excavation, backfilling, compacting of trenches and breaking into existing manholes, inlets or storm sewers required to provide a completed storm sewer at the locations shown on the contract drawings.

3.02 PROTECTION OF EXISTING UTILITIES

A. Utility locations shown on contract drawings are approximate. Contractor shall contact all utility companies at least three working days prior to excavation for locations of all buried utilities owned by them. Should utilities be unexpectedly encountered during excavation, consult Engineer immediately for directions as to procedure. Cooperate with the Owner and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner. Contractor shall be responsible for the cost of repairing damaged utilities.

3.03 CORRUGATED METAL PIPE (CMP) STORM SEWER

A. Corrugated metal pipe shall be constructed as shown on the contract drawings and in accordance with the Special Procedures and Sections 520, 521, and 529 of the State of Wisconsin, Department of Transportation, Standard Specifications, with the following exceptions and additions:

1. Joints shall be of watertight bolted bands installed as per manufacturer's instructions.
2. Backfill and embedment shall be as noted in the Special Procedures and shall be incidental to storm sewer construction.
3. Basis of payment will be per lineal foot in place. Miscellaneous bends, fittings and bands shall be included in the unit bid price of the associated pipe. The footage to be paid for shall not include the construction into or through catch basins, manholes, and inlets.

3.04 HIGH DENSITY POLYETHYLENE PIPE (HDPE)

A. High density polyethylene pipe shall be constructed as shown on the contract drawings and, in accordance with the Special Procedures - Division 01 and Section 608 of the State of Wisconsin, Department of Transportation, Standard Specifications, and in accordance with "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications" (ASTM D 2321) with the following exceptions and additions:

1. Joints for sewer pipe shall be sealed to be watertight in accordance with AASHTO Standard Specifications for Highway Bridges, Division II, Section 30.4.2.1
2. Embedment shall be Class II or as indicated in Special Procedures - Division 01 and shall be incidental to storm sewer construction.
3. Backfill shall be Type II as specified in Trenching and Backfilling - Division 31 or as indicated in Special Procedures - Division 01. Backfill shall be incidental to storm sewer construction.

3.05 POLYVINYL CHLORIDE PIPE (PVC)

3.06 LAYING SEWER PIPE FOR CURVES

A. Sewers laid on curves shall be one of the following types:

1. Deflection of pipe joints will be permitted when the joint opening is less than 1/2 the length of the tongue for mortar joints or 1/4 the length of the tongue with rubber gasket joints; otherwise use cut-off pipe or miter pipe.
2. Cut-off pipe shall be molded with the difference between the longest and shortest sides, measured along the outside of the pipe, conforming to the values given in Table 1. Lengths of pipe other than that shown may be used only with approval of the Engineer.
3. Miter pipe shall be manufactured by the removal of a wedge from the center of the pipe to provide for the required angle of deflection. Sufficient additional reinforcement shall be added at the spring lines and top and bottom of the pipe to prevent shearing after installation. Repairs to complete the pipe shall be such that the concrete shall have the same strength as that of the remainder of the pipe barrel and shall not spall or separate. Miter pipe shall be used for all elliptical pipe laid on a curve. Miter pipe for circular sewers shall be used only with the approval of the Engineer.

Table 1
Cut-Off of Pipe for Curved Sewer (inches)
(4-foot long pipe sections)

Pipe I.D. Inches	Radius of Curve in Feet							
	40	50	57.3	60	70	80	90	100
21	2-5/8	2-1/8	1-3/4	1-3/4	1-1/2	1-3/8	1-1/4	1/1/8
24	2-7/8	2-3/8	2	2	1-3/4	1/1/2	1-3/8	1-1/4
27	3-1/4	2-5/8	2-1/4	2-1/8	1-7/8	1-5/8	1-1/2	1-3/8
30	3-1/2	2-7/8	2-1/2	2-3/8	2-1/8	1-7/8	1-5/8	1-1/2
36	4-1/4	3-3/8	3	2-7/8	2-1/2	2-1/8	1-7/8	1-3/4
42	--	3-7/8	3-3/8	3-1/4	2-7/8	2-1/2	2-1/4	2
48	--	4-3/8	3-7/8	3-3/4	3-1/4	2-7/8	2-1/2	2-1/4
54	--	--	4-3/8	4-1/8	3-5/8	3-1/8	2-7/8	2-1/2
60	--	--	--	--	4	3-1/2	3-1/8	2-3/4
66	--	--	--	--	4-3/8	3-3/4	3-3/8	3-3/8
72	--	--	--	--	--	4-1/8	3-5/8	3-3/8
78	--	--	--	--	--	4-3/8	4	3-5/8
84	--	--	--	--	--	4-3/4	4-1/4	3-7/8
96	--	--	--	--	--	--	4-7/8	4-3/8

3.07 TESTING

A. Leakage Testing. All storm sewers shall be tested for excessive infiltration and sand leakage. All sand leaks shall be repaired by the Contractor at his expense. If in the judgment of the Engineer the infiltration will cause a continued maintenance problem, the sewer shall be repaired by the Contractor at his expense.

B. Alignment and Grade shall be checked by lamping method to detect poor alignment, offset joints, sags, kinks, or open joints; defects shall be corrected by the Contractor before final acceptance. If closer inspection is warranted, the Owner may arrange for a televised inspection. The Owner will assume the cost of televised inspection if no serious defect is found. If defects are found which the Engineer attributes to the failure of proper installation or sound materials, the Contractor shall pay for the test. Defects shall be promptly corrected.

C. Deflection Limitation. Deflections in corrugated metal pipe shall be limited to 5 percent of the nominal pipe diameter. If visual inspection indicates a greater deflection, the Contractor shall supply and pull a rigid ball or mandrel with a diameter 5 percent less than the nominal pipe size through the sewer. Failure of the ball to freely pass through shall be cause for rejection of the sewer.

D. Deflection Test. All HDPE and PVC pipe installations shall be tested for deflection by using a rigid ball or mandrel and shall be performed in accordance with ASTM D2321 and without the use of mechanical pulling devices. Deflection may not exceed 5 percent if tested within 30 days of placement of final backfill or 7.5 percent if tested more than 30 days after final backfill is placed. Final backfill must be in place prior to testing.

E. Acceptance. If any of the tests are not met, the Contractor shall, at his own expense, determine the source of the problem and repair or replace all defective work.

3.08 PROTECTING OPENINGS

A. Fences shall be provided around all openings and whenever required for the protection of the public. They shall be neat and substantial. All openings, fences, and surface obstructions shall be guarded and shall be indicated at night by suitable flashers.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Public storm utility drainage piping shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

B. All work specified herein shall be considered in each of the measurement and payment method(s) stipulated, unless indicated otherwise in the Bid Schedule or Special Procedures - Division 01.

4.02 PUBLIC STORM UTILITY DRAINAGE PIPING

A. Storm Sewer, (Material), (Diameter), Lineal Foot. Measurement for the public storm utility drainage piping shall be for the lineal foot of storm sewer installed, measured from the endwalls. Payment shall be made at the contract unit price bid per lineal foot of storm sewer installed. Contractor shall furnish and install all bedding, fittings and appurtenances required to complete the project. All said costs shall be included in the respective storm sewer bid items.

B. Apron Endwalls, inclusive. Measurement and payment for apron endwalls will be inclusive in the linear foot price of the culvert piping.

END OF SECTION