DOCUMENT 00 90 00
ADDENDUM

ADDENDUM NO. [1] **Date: January 2, 2020**

RE: **WITC – NEW RICHMOND CAMPUS**
VETERINARY TECHNICIAN ADDITION REBID 2020
1019 SOUTH KNOWLES AVE
NEW RICHMOND, WI 54017
HSR PROJECT NO. 18043-6

FROM: HSR Associates, Inc.
100 Milwaukee Street
La Crosse, WI 54603
(608) 784-1830

To: Prospective Bidders

This addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated December 2019. Acknowledge receipt of this Addendum in the space provided on the bid form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of [2] pages, updated prequalification list, [1] alternates section and Divisions 31, 32 and 33 sections.

CHANGES TO BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT:

1. PROJECT MANUAL TITLE PAGE: Change the Mechanical contact to Kris Dubiel in lieu of Scott Kramer.
2. Section 00 11 15 PREQUALIFIED CONTRACTORS (Vet Tech Project Only).
    a. Revised section attached hereto.

CHANGES TO GENERAL REQUIREMENTS

3. Section 01 23 00 ALTERNATES.
    a. Revised section attached hereto.

CHANGES TO SPECIFICATIONS:

4. Division 31, 32 and 33
    a. Sections attached hereto as part of the Contract Documents

CHANGES TO DRAWINGS:

5. Sheet C200 Site Layout Plan
    a. Change the chain link fence to +/-28’ x 24’ at the outside kennel area. Add a 36” lockable man gate, location TBD. The entire fence and related accessories shall be included in the BASE BID.

6. Sheet A100 Floor Plans / Reflected Ceiling Plans
    a. Detail 2: The room south of the addition in the existing building is 1319. Add the following: “Timing of all work in this existing room and the adjacent hall space shall be coordinated with Owners classroom schedule. Contractor to confirm timing and duration early in the project and coordinate all subcontractors work as required.”
    b. Detail 2: Keynote “30” in Vestibule 1400C pertains to the eye wash station in room 1404.
    c. At the “FLOOR PLAN KEY NOTES”, #35 add the following: “Owner furnished and Contractor installed.”

PRIOR APROVALS:

1. Section 07 21 00 THERMAL INSULATION: ACH Foam Technologies, Foam-Control Plus 150 15 psi. (Foundation locations only.)

END OF DOCUMENT 00 90 00

SECTION 00 11 15

PREQUALIFIED CONTRACTORS

PART 1: GENERAL

1.01 THE FOLLOWING LIST REPRESENTS APPROVED CONTRACTORS AND SUBCONTRACTORS FOR 2020 PROJECTS:

A. GENERAL CONTRACTORS

1. Angelo Luppino, Inc.
    a. 11434 N. Island Lake Road, Iron Belt, WI 54536
    b. Contact: Rick Cunico
    c. Phone: 715-561-4906
    d. Email: aluppinoinc@yahoo.com
2. Dell Construction Co., Inc.
    a. 4220 Cardell Road, Eau Claire, WI 54703
    b. Contact: Donna Rodgers
    c. Phone: 715-834-0501
    d. Email: drodgers@dellconstruction.com
3. Derrick Building Solutions
    a. 1505 Highway 65, New Richmond, WI 54017
    b. Contact: Chad Derrick
    c. Phone: 715-246-2320
    d. Email: cderrick@derrickbuilt.com
4. Ebert Construction
    a. 23350 County Road 10, Corcoran, MN 55357
    b. Contact: Markus Ebert
    c. Phone: 763-498-7844
    d. Email: mebert@ebertconst.com
5. Gardner Builders
    a. 2 West First Street, Suite 133, Duluth, MN 55802
    b. Contact: Greg Wegler
    c. Phone: 218-428-0475
    d. Email: gregw@gardner-builders.com
6. Howard Immel, Inc.
    a. 1820 Radisson Street, Green Bay, WI 54302
    b. Contact: Paul Martzke
    c. Phone: 920-468-8208
    d. Email: paulma@immel-builds.com
7. Johnson Wilson Constructors, Inc.
    a. 4431 West Michigan Street, PO Box 16006, Duluth, MN 55816
    b. Contact: Shane Johnson
    c. Phone: 218-628-0202
    d. Email: sjohnson@johnsonwilson.com
8. Market & Johnson, Inc.
    a. 2350 Galloway Street, PO Box 630, Eau Claire, WI 54702
    b. Contact: Dean Griffith
    c. Phone: 715-834-1213
    d. Email: dgriffith@market-johnson.com

9. Max Gray Construction
    a. 2501 5th Avenue West, Hibbing, MN 55746
    b. Contact: James Abrahamson
    c. Phone: 218-262-6622
    d. Email: jabrahamson@maxgrayconst.com
10. Miron Construction Co., Inc.
    a. 1471 McMahon Drive, Neenah, WI 54956
    b. Contact: Jason Fuhrmann
    c. Phone: 920-969-7095
    d. Email: jason.fuhrmann@miron-construction.com
11. Northwest Builders, Inc.
    a. 2063 17 ½ Avenue, Rice Lake, WI 54868
    b. Contact: Chris Mlejnek
    c. Phone: 715-234-7066
    d. Email: chrism@nwbuildersinc.com
12. Olympic Builders General Contractors
    a. 405 North Star Road, Holmen, Wi 54636
    b. Contact: William Yahnke
    c. Phone: 608-526-4622
    d. Email: office@olympicbuildersgc.com
13. R. J. Jurowski Construction, Inc.
    a. 36385 Jurowski Drive, PO Box 335, Whitehall, WI 54773
    b. Contact: Bill Jurowski
    c. Phone: 715-538-4661
    d. Email: billjurowski@triwest.net
14. Rhom Construction
    a. 2105 N. Clairemont Avenue, Eau Claire, WI 54703
    b. Contact: Nicholas Mohr
    c. Phone: 715-514-4172
    d. Email: nmohr@rhomconstruction.com
15. Ross & Associates, Ltd
    a. 246 Summit Road, River Falls, WI 54022
    b. Contact: Daniel Ross
    c. Phone: 715-425-9011
    d. Email: dross@rosscm.com
16. Terra Construction
    a. 21025 Commerce Blvd, Suite 1000, Rogers, MN 55374
    b. Contact: Ben Newlin
    c. Phone: 763-463-0220
    d. Email: bnewlin@terragc.com
17. V & S Construction Services, Inc.
    a. 2019 22 ½ Avenue, PO Box 557, Rice Lake, WI 54868
    b. Contact: Todd Schieffer
    c. Phone: 715-234-9174
    d. Email: todds@vscontractors.com

B. PLUMBING CONTRACTORS

1. A to Z Plumbing & Heating, Inc.
    a. 1110 W Lakeshore Drive, Ashland, WI 54806
    b. Contact: Zygmund J. Jublonski
    c. Phone: 715-682-8520
    d. Email: zygatoz@centurytel.net
2. Badger State, Inc.
    a. 2507 Fortune Drive, Eau Claire, WI 54703
    b. Contact: Fred Gardner
    c. Phone: 715-874-7777
    d. Email: fred@badgerstateinc.com
3. Bartingale Mechanical, Inc.
    a. 43213 Louis Avenue, Suite G, Eau Claire, WI 54703
    b. Contact: Mark Franson
    c. Phone: 715-835-3169
    d. Email: markfranson@bartingalemechanical.com
4. Belknap Plumbing & Heating, Inc.
    a. 1414 Belknap Street, Superior, WI 54880
    b. Contact: Chris Scharte
    c. Phone: 715-394-7754
    d. Email: cscharte@belknapsd.com
5. Blakeman Plumbing & Heating, Inc.
    a. 44941 State Hwy 13, Ashland, WI 54806
    b. Contact: Dean Blakeman
    c. Phone: 715-682-6050
    d. Email: dean@blakemanplumbing.com
6. Certified, Inc.
    a. 350 Sunday Drive, Altoona, WI 54720
    b. Contact: Russ Ryan
    c. Phone: 715-834-5409
    d. Email: russr@certified-plumbing-heating.com
7. Countryside Plumbing & Heating, Inc.
    a. 321 Wisconsin Drive, New Richmond, WI 54017
    b. Contact: David Wilcox
    c. Phone: 715-246-2660
    d. Email: dave@countrysideph.com
8. Halverson Brothers, Inc.
    a. 1020 N Broadway, Menomonie, WI 54751
    b. Contact: Mark or Brady Dahms
    c. Phone: 715-235-0651
    d. Email: halbros@wwt.net
9. Steiner Plumbing, Electric & Heating, Inc.
    a. N8230 945th Street, River Falls, WI 54022
    b. Contact: Luke Steiner
    c. Phone: 715-425-5544
    d. Email: luke@steinerinc.net
10. The Jamar Company
    a. 4701 Mike Colalillo Drive, Duluth, MN 55807
    b. Contact: Scott Torvinen
    c. Phone: 218-628-1027
    d. Email: scott.torvinen@jamarcompany.us

C. MECHANICAL CONTRACTORS

1. A to Z Plumbing & Heating, Inc.
    a. 1110 W Lakeshore Drive, Ashland, WI 54806
    b. Contact: Zygmund J. Jublonski
    c. Phone: 715-682-8520
    d. Email: zygatoz@centurytel.net
2. Badger State, Inc.
    a. 2507 Fortune Drive, Eau Claire, WI 54703
    b. Contact: Fred Gardner
    c. Phone: 715-874-7777
    d. Email: fred@badgerstateinc.com
3. Bartingale Mechanical, Inc.
    a. 43213 Louis Avenue, Suite G, Eau Claire, WI 54703
    b. Contact: Mark Franson
    c. Phone: 715-835-3169
    d. Email: markfranson@bartingalemechanical.com
4. Belknap Plumbing & Heating, Inc.
    a. 1414 Belknap Street, Superior, WI 54880
    b. Contact: Chris Scharte
    c. Phone: 715-394-7754
    d. Email: cscharte@belknapsd.com
5. Blakeman Plumbing & Heating, Inc.
    a. 44941 State Hwy 13, Ashland, WI 54806
    b. Contact: Dean Blakeman
    c. Phone: 715-682-6050
    d. Email: dean@blakemanplumbing.com
6. Central Sheet Metal Works Inc.
    a. 1225 Ogden Ave, Superior, WI 54880
    b. Contact: Steve Sislo
    c. Phone: 715-394-6593
    d. Email: steve@csmsuperior.com
7. Certified, Inc.
    a. 350 Sunday Drive, Altoona, WI 54720
    b. Contact: Russ Ryan
    c. Phone: 715-834-5409
    d. Email: russr@certified-plumbing-heating.com
8. Countryside Plumbing & Heating, Inc.
    a. 321 Wisconsin Drive, New Richmond, WI 54017
    b. Contact: David Wilcox
    c. Phone: 715-246-2660
    d. Email: dave@countrysideph.com
9. Halverson Brothers, Inc.
    a. 1020 N Broadway, Menomonie, WI 54751
    b. Contact: Mark or Brady Dahms
    c. Phone: 715-235-0651
    d. Email: halbros@wwt.net
10. Steiner Plumbing, Electric & Heating, Inc.
    a. N8230 945th Street, River Falls, WI 54022
    b. Contact: Luke Steiner
    c. Phone: 715-425-5544
    d. Email: luke@steinerinc.net

11. The Jamar Company
    a. 4701 Mike Colalillo Drive, Duluth, MN 55807
    b. Contact: Scott Torvinen
    c. Phone: 218-628-1027
    d. Email: scott.torvinen@jamarcompany.us3

D. ELECTRICAL CONTRACTORS

1. B & B Electric, Inc.
    a. 1303 Western Avenue, Eau Claire, WI 54703
    b. Contact: Michael Bergh
    c. Phone: 715-832-1676
    d. Email: mb@b-belectricinc.com
2. Benson Electric Company
    a. 1102 North Third Street, Superior, WI 54880
    b. Contact: Nathan Sapik
    c. Phone: 715-394-5547
    d. Email: nate@becotm.com
3. Jolma Electric, LLC
    a. 3100B Ellis Avenue, Ashland, WI 54806
    b. Contact: Jeff Jolma
    c. Phone: 715-685-1144
    d. Email: jeff@jolmaelectric.com
4. Meyers Electric Service, LLC
    a. 900 Lindy Street, Rice Lake, WI 54868
    b. Contact: Jason Meyers
    c. Phone: 715-234-3901
    d. Email: jake@meyerselectricllc.com
5. NEI Electric
    a. 605 Industrial Parkway, St. Croix Falls, WI 54024
    b. Contact: John Gerlach
    c. Phone: 715-483-3854
    d. Email: jgerlach@neielectric.com
6. Simon Electric Construction Company, Inc.
    a. 345 St. Croix Avenue, New Richmond, WI 54017
    b. Contact: Judy Simon
    c. Phone: 715-246-3873
    d. Email: judy@simon-electric.com
7. Steiner Plumbing, Electric & Heating, Inc.
    a. N8230 945th Street, River Falls, WI 54022
    b. Contact: Luke Steiner
    c. Phone: 715-425-5544
    d. Email: luke@steinerinc.net
8. TJ Electric
    a. 1049 Starr Avenue, Eau Claire, WI 54703
    b. Contact: Jordan Burch
    c. Phone: 715-834-0400
    d. Email: info@tjelectricinc.com

E. LOW VOLTAGE CONTRACTORS

1. B & B Electric, Inc.
    a. 1303 Western Avenue, Eau Claire, WI 54703
    b. Contact: Michael Bergh
    c. Phone: 715-832-1676
    d. Email: mb@b-belectricinc.com
2. Benson Electric Company
    a. 1102 North Third Street, Superior, WI 54880
    b. Contact: Nathan Sapik
    c. Phone: 715-394-5547
    d. Email: nate@becotm.com
3. Five Star Telecom
    a. 5136 Mormon Coulee Road, La Crosse, WI 54601
    b. Contact: Andy Smith
    c. Phone: 608- 796-9088
    d. Email: info@5startel.com
4. Jolma Electric, LLC
    a. 3100B Ellis Avenue, Ashland, WI 54806
    b. Contact: Jeff Jolma
    c. Phone: 715-685-1144
    d. Email: jeff@jolmaelectric.com
5. NEI Electric
    a. 605 Industrial Parkway, St. Croix Falls, WI 54024
    b. Contact: John Gerlach
    c. Phone: 715-483-3854
    d. Email: jgerlach@neielectric.com
6. Simon Electric Construction Company, Inc.
    a. 345 St. Croix Avenue, New Richmond, WI 54017
    b. Contact: Judy Simon
    c. Phone: 715-246-3873
    d. Email: judy@simon-electric.com
7. Steiner Plumbing, Electric & Heating, Inc.
    a. N8230 945th Street, River Falls, WI 54022
    b. Contact: Luke Steiner
    c. Phone: 715-425-5544
    d. Email: luke@steinerinc.net

F. ROOFING CONTRACTORS

1. Commercial Roofing, Inc.
    a. 221 Ryan Drive, Little Canada, MN 55117
    b. Contact: Mitch Hurtgen
    c. Phone: 651-483-5298
    d. Email: mitch@commercialrfg.com
2. Jeff Kusilek Construction*
    a. 1366 Maple Street, Baldwin, WI 54002
    b. Contact: Amy Drinken
    c. Phone: 715-790-1141
    d. Email: jkusilekconstruction@gmail.com

    *Shell Lake Roofing Only

3. Lake Area Roofing & Construction, Inc.
   a. 10425 Liberty Lane, Chisago City, MN 55013
   b. Contact: Gene Hollister
   c. Phone: 651-213-3232
   d. Email: genehollister@lakearearoofing.com
4. Northwest Roofing Company
   a. 150 Kleve Street, Chetek, WI 54728
   b. Contact: Edward Turauski
   c. Phone: 715-924-3644
   d. Email: nwroof@chibardun.net
5. The Jamar Company
   a. 4701 Mike Colalillo Drive, Duluth, MN 55807
   b. Contact: Scott Torvinen
   c. Phone: 218-628-1027
   d. Email: scott.torvinen@jamarcompany.us

G. CIVIL CONTRACTORS

1. Monarch Paving
   a. 768 US Hwy 8, Amery, WI 54001
   b. Contact: Neil Bakke
   c. Phone: 715-268-2687
   d. Email: neil.bakke@monarchpaving.com
2. Pember Companies, Inc.
   a. N4449 469th Street, Menomonie, WI 54751
   b. Contact: Brent Pember
   c. Phone: 715-235-0316
   d. Email: bpember@pembercompanies.com

The following 3 contractors are prequalified for the Vet Tech Project Only:

Berghammer Builders, Inc.

a. 702 W. Clayton Avenue, Clayton, WI 54004
b. Contact: Ron Lahners
c. Phone: 715-948-2811
d. Email: office@berghammerbuilders.com

First Business Solutions, Inc.

a. 1021 2nd Avenue SW, Onalaska, WI 54650
b. Contact: Tim Fitzpatrick
c. Phone: 608-796-2222
d. Email: tfitzpatrick@1stbsi.com

Schwickert's Tecta America, LLC

a. 330 Poplar Street, Mankato, MN 56001
b. Contact: Francisco Fernandez
c. Phone: 507-504-8187
d. Email: ffernandez@tectaamerica.com

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SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

1.02 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Alternates.

1.03 DESCRIPTION

A. Conditions of the Contract and pertinent portions of Sections in Division One of this Project Manual, apply to the Work of this Section as fully as though repeated herein.

B. This Section describes the alternates to the project. Refer to the Product/Execution Articles of the Contract Documents for information pertaining to the work of each alternate.

C. Each proposal under an alternate shall include all incidental work and all adjustments necessary to accommodate the changes. All work shall meet the requirements of the Contract Documents.

D. Each alternate proposal shall be submitted as an individual cost for the particular alternate and shall be proposed under the premise that no other alternates have been accepted. Should the work of an alternate called for by the Bid Form not affect the cost of the work, "No Change" shall be stated.

E. Owner may, at his option, vary the scope of the work by authorizing alternates which will add to the work, deduct from the work or substitute materials, equipment or methods.

F. Immediately following Award of Contract, awarded Contractor shall prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates, if any.

1.04 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

1.05 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Civil Improvements (Include all listed items of Work in one price)
   1. The following work shall be priced under Alternate No. 1: State the amount to be added to the base bid to complete the following:
      A (Concrete): Install 6 inch concrete pad between ramp and garage located at the southwest corner of the existing building.
      B (Gate): Replace gate with new 10 foot wide gate located near the southwest corner of the existing building as shown on C200.
      C (Turf): Install artificial turf and aggregate base system (in lieu of seeded grass) located at west side of new addition. Chain link fence shall be in Base Bid.
      D (Pipe): Install 12 inch PVC storm drain, located to the east of the addition and extending north to outfall. Work includes but is not limited to removal of existing 8 inch PVC storm drain, installation of approximately 156 LF of new 12 inch PVC storm pipe, related erosion control and seeding disturbed soil areas. Refer to related Specification Sections and Civil Drawings.

B. Alternate No. 2: Roof Warranty
   1. The following work shall be priced under Alternate No. 2: State the amount to be added to the base bid to install a 30 year EPDM roof system in lieu of base bid 20 year.

C. Alternate No. 3: Concrete Moisture Management.
   1. The following work shall be priced under Alternate No. 3: State the amount to be added to the base bid to provide time of placement concrete moisture management product as specified in Section 03 30 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 31 00 00

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SECTION 009000
CIVIL SPECIAL PROVISIONS

This section amends or supplements the standard specifications included in this specification. All provisions which are not amended or supplemented shall remain in full force and effect.

Table of Contents

SPECIAL PROVISIONS

The following are revisions, clarifications, or modifications to standard specification items.

Polyvinyl Chloride (PVC) Pipe

Pipe and fittings furnished under this classification will meet the requirements for polyvinyl chloride pipe and fittings in accordance with ASTM D-3034. SDR 26 may be specified in the Plans for installations with excessive cover.

Use PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564 for pipe installed under future building.

Pet Artificial Turf

Provide K9Grass Classic Pet Artificial Turf manufactured by ForeverLawn. Install turf over 4 inches well-draining aggregate 3/8" – 1/2" angular. Refer to K9Grass System Edge Detail – Installed over soil with hard and soft edges. Install per manufacture recommended instructions and specifications.

Salvage & Reconstruct Existing Manhole

Salvage the existing storm manhole with weir. Reconstruct the manhole at the location the plans indicate. Note: the proposed pipe invert elevations, depth, weir elevations, and rim elevations are identical to the existing conditions.

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SECTION 312300
EXCAVATIONS AND EMBANKMENTS

P A R T 1 - G E N E R A L

SUMMARY

Excavation and Embankment consists of the excavation and satisfactory disposal of all materials taken from within the right-of-way or project site for the construction of the project cuts and fills in reasonably close conformity with the line, grades, thicknesses, and typical cross-sections shown on the Plans or established by the Engineer, including any required borrow excavation and/or off-site waste. Work also includes the removal and satisfactory disposal of surface and base courses, embankment surcharge, masonry walls, foundations of buildings, or other structures that lie within the right-of-way or project grading limits, stone fences, stone piles and surplus and unsuitable materials; the replacement of unsuitable material with satisfactory material; the trimming and finishing of the cuts and fills; and maintaining such work in a finished condition until acceptance.

CLASSIFICATION

General. Excavation items will be classified as Excavation Common or Borrow as hereinafter described.

Excavation Common. Excavation Common consists of the excavation of all materials in cuts shown in the Plans or discussed in the Contract that are within the grading area, or are in close proximity to the grading area and within the right-of-way or project site and are designated in the Plans as a source of needed materials for embankment formation.

Borrow. Borrow consist of furnishing, excavating, hauling and placing approved material, provided by the Contractor, required for completion of embankments and other portions of the work when sufficient quantities of satisfactory material for such purposes cannot be obtained from within the limits of grading areas and material sources shown on the Plans or discussed in the Contract.

P A R T 2 - P R O D U C T S

MATERIALS

Materials for embankment consist of approved materials and will not contain logs, stumps, brush or other perishable material. Humus-bearing soils, in excess of the quantity needed for salvaged topsoil requirements, and other soils not suitable for roadbed or foundation construction may be placed in the outside edges of the embankment, beyond the limits of pavements or structures.

Materials to be incorporated in the top 2 inches of earth embankments will be free from large stone, rock and broken concrete or other materials which would significantly affect scarifying, compacting, and finishing the subgrade.

Materials placed in those portions of embankments through which it is proposed to bore holes for piling or to drive piling will be free from gravel, stone or broken concrete, or other material which would significantly affect the boring of holes or driving of piling.

Borrow Material. The material furnished under the item Borrow consists of satisfactory soil, or a mixture of satisfactory soil, stone, gravel or other acceptable materials, which is of a character and quality satisfactory for the purpose intended. The material must be free from sod, stumps, logs and other perishable and deleterious matter.

Borrow Source. Negotiate with property owners or others from whom the Contractor proposes to obtain borrow material.

P A R T 3 - E X E C U T I O N

EXCAVATION

Preparing Grading Area Foundation

Cut and properly dispose vegetation of a height greater than one foot before ground is broken for excavation or before embankment is placed thereon. Remove heavy sod and other perishable material underlying proposed embankments within the limits of assumed one to one slopes extending outward from the outer limits of the finished shoulder line or structure foundation. Remove, disposed of, or otherwise treat muck, peat and other unstable material.

Strip and stockpiled or otherwise salvaged all suitable topsoil material from within the grading area limits to the extent that is available and required for the performance of topsoil placement work proposed under the Contract. Stockpile excess topsoil from grading limits that will not be used for project related restoration at a location directed by Engineer. If no location is available for a stockpile the second option is to place topsoil along fill slopes to flatten grades where possible.

After suitable topsoil and required sod and other perishable or unsuitable materials have been removed, compacted or otherwise prepare the ground underlying proposed embankments as required to provide a foundation which will properly support the proposed embankment and which will permit attaining the density specified for the embankment.

Cut or form in the slopes steps or benches having vertical and horizontal faces to properly support the proposed embankment where embankment is to be placed on existing side slopes 10 feet or more in height and steeper than one vertical to three horizontal. Such steps may be cut or formed during the time of placing the embankment.

Remove completely to a depth of not less than two feet below the proposed finished grade line all pavements, asphaltic surfaces or rigid base courses occurring within the area of embankment slopes and underlying proposed embankments, or to such other depth as shown on the Plans.

Drainage during Construction

Maintain the work site in a well-drained condition at all times during construction. Blading or leveling operations is required when placing embankments and during the process of excavation

except when such excavation is in ledge rock or areas where leveling is not practical or necessary. Provide temporary drainage if it is necessary in the prosecution of the work to interrupt existing surface drainage, sewers, or under drainage, until permanent drainage work is completed. The construction of all temporary drainage installations is incidental to the construction of the work.

Stockpile topsoil to preclude interference with or obstruction of surface drainage, if stored on the right-of-way or project site during construction operations.

Preserve and protect all existing tile drains, sewers, and other subsurface drains, or parts thereof, which in the judgment of the Engineer may be continued in service without change. Repair at the Contractor's own expense damage to such facilities.

Excavation below Subgrade

Remove deposits of frost-heave material, unstable silty soils, wet and unstable soil, topsoil containing considerable amounts of humus or vegetable matter, or other undesirable foundation material from the area within the embankment slopes to such depths below the proposed finished earth grade as shown on the Plans or as directed by the Engineer. Wherever feasible, slope and drain the bottoms of such excavations so that water does not accumulate therein.

Use backfill made from selected materials from Excavation Common, Borrow or Granular Backfill, as called for on the Plan, in the special provisions or as directed by the Engineer.

Payment will be made at the contract unit price for items used in backfill and for pertinent excavation items involved in excavation below subgrade, if a unit price contract applies to the work.

Grading Embankments

Use all suitable material removed from excavation in the construction of the embankment, as far as practicable, and at such other places as shown on the Plans.

Undercut or underfill all excavated slopes or areas and all embankment slopes or areas, designated to be covered with topsoil or salvaged topsoil, to the necessary depth to provide for the specified amount of topsoil or salvaged topsoil to be placed and finished to the required grade lines and section.

Avoid removing or loosening any material outside the required slopes. Replace and thoroughly compact any such material which may be removed or loosened to the required cross-section.

Grade all intersecting roads, approaches, entrances and driveways as shown on the Plans or as laid out in the field by the Engineer.

Do not dispose waste or surplus excavation within three feet of the edge of ditches or channels. Spread waste or surplus material in thin uniform layers neatly leveled and shaped. Remove roots, stumps, logs and other objectionable material in the slopes and bottoms of ditches and channels and the holes backfilled with suitable material, or be cut to conform to the cross-section

shown on the Plans. Provide sufficient openings in spoil banks to permit surface drainage of adjacent lands. Provide suitable outlets or flumes from intercepting ditches to roadway ditches where necessary in accordance with the details shown on the Plans.

Marsh Excavation and Disposal

Complete excavation of the marshes as soon as practicable in order to obtain maximum settlement prior to proposed base and surface construction.

Excavate wet marshes having relatively unstable side slopes beginning at one end and proceed in one direction to the full width across the entire marsh immediately ahead of backfilling. Use a method and sequence of excavating and backfilling to assure, to the extent practicable, the complete removal or displacement of all peat or muck from within lateral limits called for on the Plans or as staked by the Engineer, and to the bottom of the marsh or to firm support. Excavate any displaced peat or muck accumulating ahead of the advancing embankment toe.

Excavate dry marshes having relatively stable side slopes and firm bottoms, to the extent practicable, to the width shown on the Plans or as staked by the Engineer and to the bottom of the marsh, and the construct backfill in layers.

Removing Embankment Surcharge

Remove and dispose excess fill placed above the elevation for earth grade over deposits of unstable material to secure displacement or settlement. Remove surcharge only after the fill has reached stability or the required settlement, as determined by the Engineer.

Removing Masonry Walls, Foundations of Buildings, or Other Structures

Removing masonry walls, foundations of buildings, or other structures consists of the removal of walls or foundations to a minimum of 2 feet below earth subgrade, or 2 feet below the slopes or natural ground elevation as may be necessary due to the location of the walls or foundation. Break holes in basement floors to permit drainage. Backfill those portions of all basements or other openings resulting from the removal of buildings or other structures, or openings resulting from the removal of walls or foundations of such buildings or structures, lying within the shoulder lines of the new embankment, to subgrade elevation with suitable material from excavation unless Granular Backfill is specified.

Disposing of Stones, Broken Rock and Boulders

Place, insofar as possible, all stones, broken rock and boulders not required for other construction included in the Contract, in embankments outside the limits of any proposed structure or structure foundations, and fill completely the voids between them with satisfactory soil. Dispose material that cannot be incorporated in the work either by burying in the ground within the right-of-way or project site in an approved manner or by placing off the right-of-way or project site. Comply with all regulations relating to disposal of solid wastes when material is placed outside the right-of-way or project site. Obtain written permits for disposal from the Owner of the property upon which the material is placed, unless the material is disposed of at a licensed waste disposal operation. Furnish permits, or copies of permits to Engineer prior to such disposal. Do not deposit waste in wetlands.

Disposal of Surplus or Unsuitable Material

Conserve material containing humus or of a nature suitable to support vegetation but unsatisfactory for constructing embankments, when required, and utilized in salvaged topsoil operations. Use all surplus humus-bearing soils, and other excavated materials not suitable for embankment construction but suitable to uniformly widen embankments, to flatten slopes and to fill low places in the right-of-way or on the project site, unless otherwise provided.

Dispose surplus excavation which is not or cannot be disposed of by flattening slopes or filling in low places on the right-of-way or project in places provided by the Contractor. Comply with all regulations relating to disposal of solid wastes. Dispose of in a manner that will present a neat and trim appearance, and in a manner to neither create a nuisance nor cause pollution nor siltation of natural watercourses, streams, lakes, wetlands or reservoirs. Do not dispose waste in wetlands.

Finish Grading

Complete grading, trimming and finishing prior to construction of the subbase, base or surface courses.

Make adjustments in slopes to avoid injury to standing trees or to harmonize with existing landscape features, especially at the intersection of cuts and fills, and the gradual transition to such adjusted slopes.

Round crests of earth cut banks as indicated on the Plans or as directed by the Engineer. If the rounding is not defined in the plans, round locations where slopes meet a minimum of 10 feet to create a smoot transition for lawn care and to improve appearance.

During grading operations and prior to placement of subbase, base or surface course, or topsoil for restoration, provide continuous maintenance of the grading area and perform all blading and repair work necessary to keep the grade smooth and to the required grade and cross-section.

Erosion control plans may be included in the plans. These plan may only address the control of erosion that could potentially leave the project site. During construction and prior to full turf re-establishment, perform additional erosion protection measures to keep the site protected from on-site erosion damage. Repair at no additional cost to the Owner all on-site damage cause by erosion during the construction.

Preservation of Trees and Shrubs

Preserve and protect trees and shrubs from scarring or other injury during grading operations.

Do not disturb the original ground around the trees within a minimum distance of one foot or twice the diameter of the tree, whichever is the greater distance during excavation operations. Cut cleanly exposed roots resulting from excavation and covered with humus-bearing soil.

When required on the Plans, protect trees or shrubs around which excavation or embankment is made by the construction of tree wells, built in accordance with the Plan details and as laid out in the field by the Engineer.

Dust Abatement

Minimize the dispersion of dust from the subgrade during grading and maintenance operations, until acceptance of the work, by the application of water or other approved dust control materials. Work performed to control dust is incidental to Excavation and Embankment or Base Course items.

Overhaul

The various items of work under the general heading of Earthwork includes all hauling and no allowance will be made for overhaul.

BORROW

Construction Methods

Clear and grub the area from which material for Borrow is to be obtained. Remove all sod or other perishable or unsuitable material from the proposed pit area. Excavate borrow pits in a manner to permit accurate measurement of the material excavated and incorporated in the work.

Dispose all stone, broken rock, boulders and other materials, which are not satisfactory for use in the work.

Dispose all stumps, trees, logs, brush, tops and other debris resulting from clearing and grubbing work in borrow pit area.

Except in the case of commercial pits, strip off available topsoil or other soil of a nature conducive to plant growth, overlying such pit, and placed in stockpiles in sufficient quantities to cover all surfaces of excavated areas within such pit to a depth of 4 to 6 inches. When the depth of topsoil overlying such pit is less than 4 inches, replace topsoil to the original depth. After the pit has been trimmed and finished, spread salvaged material uniformly over all excavated areas of the borrow pit, except as otherwise authorized by the Engineer in writing.

After the excavated areas of the pit have been topsoiled, fertilize and seed the pit and adjacent disturbed areas and associated haul roads except when fertilizing and seeding is not desired by the landowner.

EMBANKMENT

Clear and grub before placing embankment materials. Remove ice and snow from the surface of the ground prior to placing embankment on the ground.

Unless otherwise provided in the Contract, discontinue the construction of embankments in the fall or early winter when weather conditions prevail which will cause substantial freezing of the materials as they are placed in the embankment, except when the materials used are from rock excavation or are of a granular nature and contain only minor quantities of silt, clay, loam or similar materials.

Placing Layers

Construct embankment in layers, except as hereinafter specified. Begin construction of an embankment at the lowest point of the fill below the grade at the bottom of ravines, and construct in layers by spreading and leveling the material during placement. Spread individual layers evenly to uniform thickness throughout and approximately parallel with the finished grade for the full width of the embankment, unless otherwise directed. Do not exceed 8 inches with an individual layer; provided that on side hills too steep to operate hauling equipment, over low, wet ground, in marshes or when filling in water a single layer may be constructed to a thickness not greater than necessary to support the hauling equipment while placing subsequent layers.

Placing in Marsh

Construct embankments in trenches excavated across wet marshes or swamps, generally, by end dumping the fill material. Begin fill placement at one end of the marsh and proceed across sufficiently close to the excavating operation to permit the excavating equipment to remove any displaced peat or muck as it accumulates ahead of the advancing embankment toe. Place fill material as deposited in a manner and to the height necessary to effectively displace unstable material from within the area of the proposed embankment. Build temporary surcharges, if required, to the height and horizontal dimensions designated on the Plans and progressively move ahead as the embankment advances.

When marsh areas are excavated in a dry condition, place embankment constructed in the excavation in layers and compacted to the extent practicable.

Placing Rock

Where the material for embankment consists of rocks, broken stone or fragmented material of such size as to render placing in 8 inch layers impractical, place material in the embankment in layers not exceeding in thickness the approximate average size of the larger rocks, provided the individual pieces are so placed that there will be no nesting and all the voids are filled with smaller stones and satisfactory soil or rock fines.

COMPACTION

Except as otherwise provided for backfilling of wet marshes and construction of rock fills, compact all embankments in accordance with the requirements for Standard Compaction unless Special Compaction is called for on the Plans or in the Contract.

Do not compact embankment material when the moisture content will cause excessive rutting by the hauling equipment, or excessive displacement or distortion under the compacting equipment. Where such conditions exist, allow the materials to dry prior to compacting. When necessary, accelerate drying of such materials by aeration or manipulation by means of blade graders, harrows, discs or other appropriate equipment.

When the embankment material does not contain sufficient moisture to compact properly, add water in quantities deemed necessary to aid, accelerate and secure effective compaction.

Standard Compaction

Deposit the material for the embankment, spread and leveled, as hereinbefore provided, in layers generally not exceeding 8 inches in thickness before compaction. Compact each layer of the

embankment to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. Attain the required compaction for each layer before any material for a succeeding layer is placed thereon.

Perform compaction by specialized compaction equipment, supplemented by hauling and leveling equipment routed and distributed over each layer of the fill to make use of the compaction afforded thereby; unless the Engineer determines the compaction attained by the use of only the hauling and leveling equipment is satisfactory and sufficient. Should the Engineer determine such compaction is satisfactory and sufficient, specialized compaction equipment will not be required.

Specialized compaction equipment includes tamping rollers, pneumatic-tired rollers, vibratory rollers or other types of equipment designed for compaction which will produce the required results in the materials encountered and be subject to the approval of the Engineer.

Tamping rollers, when used for compaction, will exert a pressure of not less than 150 pounds per square inch on the tamping surface of each tamping foot in a transverse row.

Pneumatic-tire rollers or other equipment, when used for compaction, will have a mass of not less than 150 pounds per linear inch of overall rolling width.

Special Compaction

Deposit the material for the embankment upon the properly prepared ground surface, spread and leveled in layers generally not exceeding 8 inches in thickness before compaction. When the material being compacted is of a granular nature and the compacting equipment is adaptable for the purpose, the thickness of the layer may be increased to a maximum of 12 inches provided the required density is obtained. Compact each layer of the spread and leveled material, by means of suitable compaction equipment, to not less than the specified density before the succeeding layer is placed.

Compact all embankment material placed within the limits of assumed one to one slopes extending outward and downward from the outer limits of pavements or the foundations of structures to not less than the density specified for the embankment, and the embankment material placed outside such assumed slopes to be compacted in accordance with Standard Compaction.

Compact embankments of 6 feet or less in height to at least 95 percent of maximum density for their full depth. Compact the top 6 feet of embankments over 6 feet in height to at least 95 percent of maximum density. Compact those portions more than 6 feet below the finished subgrade to at least 90 percent of maximum density, except compact that embankment occurring within 200 feet of a bridge abutment to at least 95 percent of maximum density.

Determine maximum density in accordance with the Standard Proctor Test, AASHTO T 99, Method C, with replacement of the fraction of material retained on the ¾-inch sieve with No. 4 sieve to ¾-inch material. Determine density of compacted embankment material in accordance with AASHTO T 191 or by other approved methods.

If the material in the density sample differs in percentage of aggregate retained on a No. 4 sieve from that in the sample upon which maximum density was determined, adjust the maximum density in accordance with the approved Wisconsin Department of Transportation procedure.

The foregoing density requirements will not apply to portions of embankments constructed of materials which, because of numerous large stones or high percentages of material retained on the No. 4 sieve, cannot in the judgment of the Engineer be accurately tested in accordance with the above procedures for determining maximum or in-place dry density.

Subgrade Compaction in Cuts

Compact the finished earth subgrade in cut sections for a width equal to the width of the proposed pavement plus shoulders or structure foundation in accordance with Standard Compaction, unless Special Compaction is called for in the contract.

On grading projects where Special Compaction is required, compact the finished earth subgrade in cut sections to the width above described and to a depth of at least 6 inches to at least 95 percent of maximum density.

Shrinkage and Surcharge

When considered necessary by the Engineer, build embankments to such elevation above required grade to allow for settlement; or sufficient surcharge placed above the required elevation of earth grade over deposits of unstable material to secure displacement or settlement.

Slopes

Build embankment slopes to the lines and section shown on the Plans or as directed by the Engineer. Fill all voids the slopes of rock fill embankments with rock fines or soils and trim to a smooth uniform appearance.

Adjust construction of embankments, whose slopes are designated to receive topsoil or salvaged topsoil, whereby the placing of such topsoil will result in the finished embankment conforming to the required section.

Subgrade Intermediate Consolidation and Trimming

Maintain drainage during construction at the end of each work day. Consolidate and trim the subgrade to aid drainage and to protect against erosion. Consolidate and trim subgrade surface disturbed, operated over, or constructed during that work day sufficient to press all “float” material firmly against the subgrade and produce a tight, smooth, well-drained surface. Consolidate and trim surfaces when rain is imminent during the workday, sufficiently in advance of the rain to avoid ponding and erosion.

Rock, stone and boulders excavated by plowing and scarifying operations and required to be removed and disposed of will not be measured for payment.

Compensation

Embankment work prescribed in this section will not be measured or paid for directly is considered as included in the classes of Excavation Common, Borrow, Granular Backfill, and other items of work. Formation, compaction, shaping, sloping, trimming, finishing and maintaining of the embankments and all other incidental work is included in the work.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

Excavation Common actually performed and accepted as herein provided and within the specified limits, will be measured in cubic yards in their original position, computed by the method of average end areas, with no correction for curvature, except where this method is not feasible and as hereinafter provided.

Where the quantity of Excavation Common to be placed is such a minor amount that, in the judgment of the Engineer, the measurement of such minor quantity by the above method would be impractical, the measurement may be made by the cubic yard in the vehicle. Determine the capacity of each vehicle used for hauling the material to the nearest 0.1 cubic yard by the Engineer and adjust for material expansion in the vehicle (unless otherwise agreed to by the Engineer and Contractor, an expansion factor from original position to vehicle volume of 1.4 will be used).

Boulders and surface stone of one cubic yard or more in volume will be measured individually and the volume computed from average dimensions taken in three directions.

Excavation Common, measured as provided above, will be paid for at the contract unit price per cubic yard. That price is payment in full for all work specified, including all items of earth work designated on the Plan for which no separate unit prices are included in the Contract. The cost of removing walls, foundations, etc., the satisfactory disposal of material resulting therefrom, and the backfilling of basements or openings resulting from the removal of walls, foundations, etc., for which no separate unit prices are included in the Contract, will be considered included in the contract unit price for Excavation Common. Such payment includes full compensation for all equipment, tools, labor and incidentals necessary to complete the work. All hauling is included in the contract unit price per cubic yard.

Borrow will be measured in cubic yards of volume in its original position, computed by the method of average end areas, with no correction for curvature or, if the Engineer elects, by the method of truncated prisms. Notify the Engineer sufficiently in advance of the time when excavation operations will be performed so as to permit accurate measurements of borrow pit. Sod or other unsuitable material removed, or material salvaged from borrow pits and used for covering surfaces of the excavated areas within such pits, as hereinbefore provided, will not be measured for payment. The Engineer may require the Contractor to remove topsoil or other unsuitable materials from the surface of the pit area prior to taking original cross-sections of the

pit area and, upon completion of the excavation, to smooth or trim the pit, as required, to permit taking accurate final measurements of the area before the topsoil is replaced thereon. Any material excavated prior to the staking out and cross-sectioning of the borrow pit by the Engineer, and all excavated material in excess of that required for or not incorporated in the work, will not be included in the quantity measured for payment.

Where the quantity of Borrow to be placed is of such a minor amount that in the judgment of the Engineer the measurement of such minor quantity by the above method would be impractical, the measurement may be made by the cubic yard in the vehicle. The capacity of each vehicle used for hauling the material will be determined by the Engineer to the nearest 0.1 cubic yard and adjusted for material expansion in the vehicle (unless otherwise agreed to by the Engineer and Contractor, an expansion factor from original position to vehicle volume of 1.4 will be used).

The volume of borrow measured as provided above, will be paid for at the contract unit price per cubic yard for Borrow. That price is full compensation for furnishing all materials, unless otherwise provided; for all clearing, grubbing, excavating, sloping, shaping, trimming, loading, hauling, placing, watering and dust abatement unless otherwise provided, compacting; disposing of surplus and unsuitable material; for salvaging, stockpiling, rehandling and spreading salvaged material for covering surfaces of excavated areas within borrow pits; and for all labor, equipment, tools and incidentals necessary to complete the work.

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SECTION 312500
EROSION AND SEDIMENTATION CONTROLS

P A R T 1 - G E N E R A L

SUMMARY

This work shall consist of providing and maintaining temporary and permanent environmental controls for the construction site in accordance with applicable local, state, and federal regulations and permits. Environmental controls include dust control, debris control, water control, erosion and sediment control, and pollution control.

P A R T 2 - P R O D U C T S

MATERIALS

Silt Fence

Silt fence geotextile fabric shall consist of either woven or non-woven synthetic filter fabric. Non-woven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof. All fabric shall meet the following requirements:

Test	Method	Value*
Minimum grab tensile strength in the machine direction	ASTM D 4632	120 lbs.
Minimum grab tensile strength in the cross machine direction	ASTM D 4632	100 lbs.
Maximum apparent opening size equivalent standard sieve	ASTM D 4751	No. 30
Minimum permittivity	ASTM D 4491	0.05 sec^{-1}
Minimum ultraviolet stability percentage of strength retained after 500 hours of exposure	ASTM D 4355	70%

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

Provide silt fence support posts as indicated on the Plans. Wooden lath are not acceptable for silt fence support posts. When heavy-duty silt fence is required, provide wire support fence with a minimum 14 gauge with a maximum six-inch mesh. Provide heavy-duty silt fence in sensitive areas, such as disturbed slopes adjacent to surface waters, as indicated in the Plans.

Erosion Mat

Erosion mats shall conform to the current edition of the Erosion Control Product Acceptability List (WisDOT PAL) published by the Wisconsin Department of Transportation (WISDOT). In general, Class I mats are short term duration/light duty; Class II mats are long term duration/medium duty; and Class III mats are permanent (100 percent synthetic) turf reinforcement mats (TRMs). Classes

are further subdivided into types for specific installations and minimum product permissible shear stresses as follows:

Class	Type	Slope Sheer Stress	Maximum Slope	Channel Shear Stress	Notes
I	A	1.0 lb/sf	2.5:1	NP[(1)]	Only suitable for slopes
I	B	1.5 lb/sf	2:1	1.5 lb/sf	Double netted
I	Urban A[(2)]	1.0 lb/sf[(3)]	4:1	NP	Only suitable for slopes
I	Urban B[(2)]	1.0 lb/sf	2.5:1	NP	Only suitable for slopes
II	A	(Jute Fiber only, intended for sod reinforcement)			No minimum product permissible shear stress
II	B	2.0 lb/sf	2:1	2.0 lb/sf	Non-organic
II	C[(4)]	2.0 lb/sf	2:1	2.0 lb/sf	Only 100% organic
III	A	2.0 lb/sf	2:1	2.0 lb/sf	Non-soil filled
III	B[(5)]	2.0 lb/sf	2:1	2.0 lb/sf	Soil filled
III	C[(5)]	3.5 lb/sf	2:1	3.5 lb/sf	Soil filled
III	D[(5)]	5.0 lb/sf	1:1	5.0 lb/sf	Soil filled

Notes:

(1) NP – Not Permitted

(2) Urban mats are 100 percent organic biodegradable intended for use in urban areas where mowing may be accomplished in 2 weeks, or in environmentally sensitive areas that have a high probability of entrapping animals in plastic netting.

(3) No minimum product shear stress for netted mats. 1.0 lb/sf applies to non-netted mats.

(4) For environmentally sensitive areas that have a high probability of entrapping animals in plastic netting.

(5) Class III, types B, C, D (soil filled TRMs) must be covered with an approved mat for slope/channel application as applicable, which shall be considered incidental to the Class III mat.

The PAL lists all acceptable products and manufacturers for specific class and types of erosion mats.

Mulching Materials

Provide mulching material consisting of straw or hay in an air-dry condition, wood excelsior fiber, wood chips, or other suitable material of a similar nature, as approved by the Engineer, which is substantially free of noxious weed seeds and objectionable foreign matter. Marsh hay or reed canary hay is not acceptable. Straw and hay mulch that will be crimped shall have a minimum fiber length of 6 inches.

Mulching is neither necessary nor appropriate in ditches, critical areas, concentrated flow areas, adjacent to storm drain inlets where drainage areas exceed ½ acre, or slopes greater than 3:1. Do not use mulch adjacent to roadways with a posted speed limit greater than 35 miles per hour as traffic currents can cause it to erode. Install erosion mat (Class I) adjacent to storm drain inlets where mulch is desirable, unless otherwise directed by the Project Engineer.

Inlet Protection

Construct inlet protection devices with Type FF woven polypropylene geotextile fabric, as follows:

Test	Method	Value*
Grab Tensile Strength, lb.	ASTM D-4632	200 min.
Puncture Strength, lb.	ASTM D-4833	105 min.
Apparent Breaking Elongation, Machine Direction, %	ASTM D-4632	24 min.
Apparent Breaking Elongation, Cross Direction, %	ASTM D-4632	10 min.
Apparent Opening Size, μm	ASTM D-4751	600 max.
Permittivity, s^{-1}	ASTM D-4491	1.9 min.

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

Only Type FF Geotextile fabrics listed in the current edition of the WisDOT PAL list shall be accepted. Inlet protection fabric shall exceed inlet grate by 8 inches on all sides to allow removal, unless otherwise specified.

Inlet protection shall be constructed as Type A-D as indicated in the plans and details. Commercially manufactured inlet protection devices may be furnished only if listed in the current edition of the WisDOT PAL list.

Erosion Bales

Provide either straw or hay erosion bales installed in double rows as detailed on the Plans. They are intended to trap sediment and prevent channels from eroding by decreasing the velocity of low velocity and volume channel flows.

Alternate Ditch Checks

Alternate ditch checks listed on the PAL may be installed in lieu of erosion bale ditch checks and shall be paid for per lineal foot equivalent to erosion bale ditch checks as shown in the Plans. Temporary ditch checks may be reused if condition is acceptable to Engineer. Spacing of alternate ditch checks must be decreased from that specified for erosion bale ditch checks due to lessened barrier height to meet 2/3 height criteria. No additional payment will be made for additional alternate ditch check installations required, due to decreased spacing, compared to spacing of erosion bale ditch checks, unless alternate pay items exist.

Sediment logs shall consist of rolled wood excelsior fibers rolled in approximate diameters of 12 inches for medium duty and 20 inches for heavy duty applications. Sediment logs shall be trenched in 2 inches and be secured to the ground with 1-inch diameter wood stakes every two lineal feet across its length or as otherwise specified by manufacturer stakes shall be pounded in a minimum of 16 inches and no more than 6 inches of stake shall protrude above the height of the sediment long for maintenance crew safety or according to manufacturers recommendations. Sediment logs shall be installed for overtopping prior to flow around conditions, similar to erosion bale ditch checks.

Accumulated silt or debris shall be removed by Contractor, and damaged logs shall be immediately repaired or replaced.

Sediment Tracking Pads

Provide sediment tracking pads at all construction site access points to prevent off site tracking of soil as indicated on the plans. Rock sediment tracking pads will be made of hard, durable, angular stone conforming to the follow table:

Sieve Size	Percent by Weight Passing
3”	100
2 1/2”	90-100
1 1/2”	25-60
3/4”	0-20
3/8”	0-5

Place filter fabric under stone.

Sediment tracking pads will be 18 inches thick, 50 feet long, and span across the full width of the entrance or a minimum of 12 feet wide with traffic restricted to passing over the 12 foot wide pad.

Proprietary reusable tracking pads are acceptable with prior approval by the engineer.

P A R T 3 - E X E C U T I O N

ERECTION/INSTALLATION/APPLICATION

Projects shall be staged to limit the amount of bare soil and allow for revegetation.

Dust Control

Minimize the dispersion of dust from the project area during construction. Maintain dust control until final acceptance of the work. Apply water or other approved dust control materials as directed by the Engineer. Comply with OSHA regulations regarding dust control efforts. Sweep streets where sediment has been tracked.

Debris Control

Initiate and maintain a program specifically to prevent the accumulation of debris at the construction site, storage, and parking areas, or along access roads and haul routes. Provide containers for disposal of debris. Prohibit overloading of trucks to prevent spillage on access and haul routes. Schedule periodic collection and disposal of debris.

Erosion and Sediment Control

Erosion and sediment control work consists of incrementally phasing disturbance and restoration, furnishing and installing stone tracking pads, inlet protection, street sweeping, erosion mats, silt fences, ditch checks, runoff diversions, sediment basins, and other erosion and sediment control devices in accordance with the Plans and as determined necessary by the Engineer.

Projects disturbing more than one acre are subject to the requirements of the Wisconsin Department of Natural Resources (WDNR) WPDES General Storm Water Permit for Construction Sites. A Storm Water Management Plan and an Erosion and Sediment Control Plan (Report) are developed for projects with a WPDES permit. The Best Management Practices (BMPs) selected for this project, as identified in the Report, are incorporated into the final Plans and specifications.

For all projects, perform installation, necessary maintenance on erosion control practices, assist in weekly inspections of erosion control practices, establishing final stabilization of the site or until the Notice of Termination has been filed with the DNR in the case of projects more than one acre, and removal of temporary BMPs.

For all projects, furnish the Engineer a project specific Erosion Control Implementation Plan (ECIP) one week prior to the preconstruction meeting or one week prior to commencing construction if a preconstruction meeting is not held. The ECIP shall be in accordance with the plans, report, and specifications. An ECIP worksheet is included in this specification for contractors use in developing an ECIP for this project.

Place down gradient sediment control measures where shown on the Plans and/or as directed by the Engineer prior to any grading or disturbance of existing surface material.

Provide periodic inspection and maintenance of sediment control structures to ensure the intended purposed is accomplished. Maintain sediment control measures in working condition at the end of each working day. Weekly and after 0.5 inches rainfall, inspect and document the condition of all BMPs unless indicated otherwise in the Special Provisions. A copy of WDNR Form 3400-187 construction Site Inspection Report is included at the end of this section. Any damaged or failing structures shall be repaired or replaced within 24 hours of discovery or as otherwise directed by the Engineer. Under normal conditions, ditch checks and silt fence barriers require removal of trapped sediment. Remove sediment deposits within 5 days of when deposits reach half the height of the barrier. If maintenance is difficult due to location or presence of wet soils that prohibit prompt cleaning after runoff events, construct additional barriers and sediment shall be removed within 5 days upon achieving access.
Install erosion control and sediment control measures per manufacturers recommendations including, but not limited to, furnishing and installing specified anchoring devices (such as staples in the case of erosion mats and stakes of specified thickness and length for sediment logs and ditch checks) and installation recommendations shall govern unless otherwise specified. Excess erosion mat may not be left on site unrolled; cut excess mat from the roll and remove from the site.

Use erosion bales on or at the toe of slopes to control sheet flow or to control channel flow in un-stabilized minor swales, ditches, or diversions with relatively small contributing drainage areas. The spacing between erosion bale barriers is determined based on the difference in elevation of the barriers. The difference in elevation between barriers may not exceed 2/3 the height (14" effective height) of the erosion bale. (For example, a standard bale installed on a 2% grade allows the rows to be placed approximately 40 feet apart). Install erosion bales shall be placed of a width, as measured perpendicular to flow, that exceeds the expected width of water flow by at least one bale on each side so that storm water will overtop the top of bales, not go around them. In absence of specified channel erosion mat, Class II, Type B erosion mat shall be installed with all erosion bale

ditch checks as detailed. Erosion bales may not be used in intermittent and perennial stream channels. Payment for erosion bales shall be on a lineal foot basis for (double rows) each separate installation. Payment for ditch check erosion mat shall be paid for separately as indicated in the bid documents, or incidental to the payment for erosion bale ditch checks in absence of a separate pay item for erosion mat. Payment will not be made for bales not trenched in or otherwise improperly installed.

Construct tracking pads with 18 inches minimum thickness. Direct runoff from tracking pads to an approved erosion control treatment device. Prevent water from running through the tracking pad by grading or using a culvert capable of passing the 2-year, 24-hour rain event.

Sweep tracked soil or otherwise remove by mechanical means from paved roads located near the construction site daily or as otherwise approved by the Engineer. Washing sediment from roads is not allowed. Inspect tracking pads daily and remove and replace materials when no longer effective, as determined by the Engineer.

Provide inlet protection at all storm sewer structures collecting runoff from the site. Contractor may furnish and install commercially manufactured inlet protection devices only if listed in the WisDOT PAL list.

Deep till/chisel plowing practices are required for areas compacted by construction equipment to restore soil infiltration properties. This work shall be considered incidental to topsoiling operations. Restore areas compacted by hauling activities prior to placement of topsoil on subsequent restoration efforts.

If mulch is called for in the plans, place mulch same day seeding has been completed. Prepare all areas to be mulched to be reasonably free of rills and gullies. Do not place mulch during periods of excessively high wind, which would preclude the proper placing of the mulch.

The placed mulch shall be loose or open enough to allow air to slowly circulate, but thick enough to shade the ground, conserve soil moisture and prevent or reduce erosion. Place mulch to provide 100% coverage at the time of initial placement. Spread out thick clumps that do not allow air movement through the mulch mat to avoid mold growth from sealing the surface and restricting growth opportunity for new grass.

Maintain mulched areas and shall repair any areas damaged by wind, erosion, traffic, fire or other causes prior to final or partial acceptance of work under the contract.

The contractor may perform the work as specified in one of the following ways: Method A, Method B, or Method C, or a combination of the 3, unless a specific method is specified in the contract.

<u>Method A, Netting</u>

Uniformly spread the mulching material over the designated areas to a loose depth of 1/2 to 1 1/2 inches. Loosen or make fluffy the mulch material from compacted bales before spreading in place. Unless directed otherwise, begin mulching at the top of the slopes and proceed downward.

Securely anchor straw or hay mulch by using engineer-approved netting anchored to the ground with pegs or staples to prevent it from floating as the vegetation grows. Instead of this anchorage, the contractor may secure mulch by heavy biodegradable twine fastened by pegs or staples to form a grid with 6 to 10 feet spacing.

The contractor may use department-approved erosion control mats, listed in the WisDOT PAL, instead of separately applying mulch and netting.

Method B, Tackifier

Treat straw or hay with a tackifier, blow from a machine, and uniformly deposit over designated areas in one operation. Place straw or hay uniformly over the area 1/2 to 1 inch deep, using 1/2 to 3 tons of mulch per acre. Mix and place tackifier according to the WisDOT PAL. Within the above limits, the engineer will review, on the job, the application rate of the mulch and the tackifier, and the engineer may request the contractor to vary the rates during mulching to produce the desired results. Use an engineer-approved machine to place the mulch that blows or ejects by constant air stream a controlled quantity of mulch and applies a spray of tackifier to partially coat the straw or hay, sufficient to hold together and keep in place the deposited straw or hay. The contractor may apply the tackifier as an overspray in a separate operation after placing the straw or hay.

Apply wood fiber, wood chips, or similar material with engineer-approved blowing machines, or other engineer-approved methods, that place a controlled quantity of mulch uniformly over the area 1/2 to 1 ½ inches deep. Treat areas receiving wood chip mulch, with one pound of available nitrogen per 1000 square feet before or after applying the chips.

Throughout the process, feed the mulch material into the blowing machine to produce a constant and uniform ejection from the discharge spout, and operate in a position to produce mulch of uniform depth and coverage.

Method C, Crimping

Spread the straw or hay mulch uniformly over the designated areas to a loose depth of 1/2 to 1 ½ inches, using 1/2 to 3 tons of mulch per acre, by blowing from a machine, as specified in Method B, or by other engineer-approved methods.

Immediately after spreading, anchor the mulch in the soil by using a mulch crimper consisting of a series of dull, flat discs with notched edges. Space the 20 inch diameter discs at about 8 inch centers. Equip the crimper with a ballast compartment to allow adjusting the weight for depth control.

Impress the mulch into the soil 1 1/2 to 2 1/2 inches deep in one pass of the crimper. The department will not allow mulch crimpers to operate on slopes so steep that damage to the mulch, seedbed, or soil occurs. Anchor the mulch on these areas by one of the following methods: Method A or Method B. Equip and operate tractors to minimize disturbing or displacing the soil. This process may require more than one pass of the crimper to ensure adequate anchoring of the mulch.

The contractor shall not use Method C if it cannot impress the mulch to a minimum of 1 1/2 inch.

Contractor may opt to integrate Seeding Method B with Method B, Tackifier. This mulching method is required for all urban (lawn-type) areas unless otherwise specific in the contract.

Overspray onto non-topsoil surfaces shall be minimized. Clean off overspray onto personal property, power poles, hydrants, utility pedestals, etc.

Turf Establishment Time Limits

Stabilize all ditch inverts with seeding, ditch checks, and erosion mats as indicated in the Plans. Erosion mats shall extend a minimum of one foot above the invert elevation on the ditch side slopes. Stabilize all ditch inverts within 3 days of the initial excavation.

For grading activities on slopes greater than 4:1, prior to seeding, complete dozer-tracking perpendicular to the slope to minimizing erosion. Temporarily mulch, seed and mulch, sod, or seed with erosion mat all slopes within 7 days of initial excavation or at the direction of the Engineer. Incrementally construct slope areas on an area by area basis to meet these specified turf establishment time limits.

Seed and mulch all non-slope and non-ditch project areas within 7 days of topsoil placement. Seed all areas within 21 days after the initial excavation. Incrementally construct restoration for non-slope and non-ditch areas on an area by area basis to meet these specified turf establishment limits.

In addition to the standard turf establishment time limits specified above, establish same day stabilization, seeding and/or temporary cover for critical areas. Critical areas are defined as land within 75 feet of any wetland or waters of the state, slopes greater than 3:1, or any other area identified as a critical area in the Plans.

The Engineer/Owner reserves the right to require daily stabilization/restoration (topsoiling, seeding, mulch, or temporary seeding and mulch) including the installation of erosion and sediment control devices for all work days after October 15th. During any time of the construction season, perform same day stabilization/restoration if a significant rainfall event is imminent.

Pollution Control

Provide OSHA approved temporary restroom facilities for use at the site. Clean and maintain restrooms regularly as needed but no less than once per week.

Provide methods, means, and facilities required to prevent contamination of soil, water, or air by the discharge of noxious substances from construction operations. Provide equipment and personnel to perform emergency measures required to contain any spillages of hazardous materials due to construction operations. Excavate, remove, and properly dispose of any contaminated soil, and replace excavated soil with clean compacted fill. Provide equipment and personnel to prevent harmful or hazardous substances from entering public waters. The disposal of project created wastes, effluents, chemicals, and surface waters in sanitary sewers is prohibited, unless specific permission is obtained from the sewer owner. The disposal of wastes, effluents, chemicals, or

contaminated surface waters in storm sewers is prohibited. Provide systems for control of air pollutants, prevent toxic concentrations of chemicals, and prevent dispersal of toxic concentrations of pollutants into the atmosphere.

Removal of Erosion control Devices

After the site is stabilized and turf developed to the extent that future erosion is unlikely and upon approval by the engineer, remove all erosion control devices. ~~Use erosion bales as mulch or dispose if spreading additional mulch will not benefit site restoration.~~ After removal of bales and ditch checks, reshape ditches, fill sumps and trenches, dispose excess eroded material topsoil area, and fertilize and seed as necessary.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

Payment for environmental controls shall be incidental to the work unless specifically included in the Contract items. When specific items are included in the contract, measurement and payment shall be as follows:

Erosion mat is measured by the square yard, and the quantity measured for payment is the number of square yards of surface area upon which the erosion mat has been placed and accepted. No allowance is made for portions of the mat required to be entrenched in the soil for any end or junction slot or for required overlaps. The quantity is paid for at the contract unit price per square yard, which price shall be full compensation for placing and anchoring the mat including staples; for any required preparation of the seeded areas; for installing end and junction slots; for repairing and reseeding damaged areas; for furnishing and applying water; for disposal of all surplus and waste materials; and for furnishing all labor, tools, equipment and incidentals to complete the work in accordance with the Contract.

Erosion bale ditch checks and alternate ditch checks are measured per lineal foot for each equivalent erosion bale installation as shown in the Plans. The quantity is paid for at the contract unit price, which shall be full compensation for placing all materials including stakes; for anchoring; for all excavation, including trenches and sumps; for any repair; for removing or spreading the accumulated sediment to form a surface suitable for seeding; for removal and disposal of all waste or surplus materials including eroded materials; for shaping and restoring ditches; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work in accordance with the Contract.

Mulch is measured by the square yard, and the quantity measured for payment is the number of square yards of surface area upon which the erosion mat has been placed and accepted. The quantity is paid for at the contract unit price per square yard, which price shall be full compensation for placing and anchoring the mulch including binding, binder, or staples; for any required preparation of the seeded areas; for repairing and reseeding damaged areas; for furnishing and

applying water; for disposal of all surplus and waste materials; and for furnishing all labor, tools, equipment and incidentals to complete the work in accordance with the Contract.

Inlet protection is measured and paid for per each as indicated in the bid form. In absence of different types of inlet protection in the bid form, all types are paid for as inlet protection per each. Inlet protection devices shall not be eligible for payment if wrong geotextile fabric is used, or if deemed not acceptable by the Engineer.

Silt fence is measured in place by the lineal foot. Measurement is along the base of the fence, center to center of end post, for each section of fence. The quantity is paid for at the contract unit price per lineal foot, which price is payment in full for erecting fence, including all excavation, placing of posts, backfilling, and attaching geotextile fabric; for any required cleaning and repairing; for removing or spreading the accumulated sediment to form a surface suitable for seeding; for the replacement of silt fence and all damages caused by overloading of sediment material or ponding of water adjacent to the silt fence; for removing the fence at completion of the project; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work in accordance with the Contract.

Sediment tracking pads are measured in place and paid for per each as indicated on the bid form.

Maintenance of erosion and sediment control measures is imperative and is the responsibility of the Contractor. The Owner reserves the right to make payment to Contractor for only 50 percent of quantity of erosion and sediment controls at the time of installation. The remaining payment shall be retained for assurance of maintenance and removal (as applicable) of erosion and sediment control items.

EROSION CONTROL IMPLEMENTATION PLAN (ECIP) WORKSHEET

The ECIP shall be prepared in a detailed, written and pictorial format that identifies the schedule, timing, and methodology for the contractor's implementation of the project's erosion control plan. The ECIP shall be furnished one week before the preconstruction meeting, or one week prior to commencing construction if a preconstruction meeting is not held. The ECIP shall be in accordance with and complimentary to the project erosion control plans, specifications, and report.

Project ID: _____ County: _____

Description of Project: _____

Prime Contractor: _____

Address: _____

Contact Person: _____ Phone: _____

Include the following:

1. Principal contact of the contractor responsible for installation, maintenance, and removal of erosion and sediment control best management practices (BMPs).

   Name: _____

   Phone: _____

   Firm: _____

   Address: _____

2. A description of the intended timetable and sequence of major land disturbing activities.

3. A description of erosion control and stormwater management measures to be utilized and a schedule for implementing them, including staging construction to limit disturbed areas subject to erosion; timing of erosion control mobilizations; method for winter shut-down; and the removal of temporary measures. Include the appropriate plan sheets to identify timing and/or location of BMPs.

4. A description of any additions, amendments, deletions or modifications to the project erosion control plan or any of the contract documents which pertain to erosion control and stormwater management for the project sites.

5. Site map(s) and/or annotations on the project plans including:
   a. Boundaries of the site and areas of soil disturbance.
   b. Location of major structural and non-structural erosion control and stormwater management practices.
   c. Location of areas where stabilization will be employed, including but not limited to vegetation, following construction activities.

d. Locations where stormwater is discharged to a surface water or wetland.
e. Locations of any haul roads and site access points.

6. A description of selected erosion and sediment control BMPs that will be employed at the site to prevent sediments and pollutants from reaching waters of the state, including wetlands. The plan shall clearly describe the appropriate best management practice for each major activity identified and the timing during the construction process that the measures will be implemented. The description of BMPs shall include:
   a. Description of permanent or temporary erosion control and stormwater management measures. Plans shall ensure the preservation of existing vegetation where practical.
   b. Description of structural practices to divert runoff away from exposed soils, to store flows or to otherwise limit runoff and the discharge of pollutants from the site.
   c. Management of overland flow at the site.
   d. Trapping of sediment in channelized flow.
   e. Staging construction to limit disturbance of areas susceptible to erosion.
   f. Protection of downslope drainage inlets.
   g. Minimization of tracking at the site.
   h. Clean up of off-site sediment deposits.
   i. Proper disposal of building and waste material at the site.
   j. Stabilization of drainage ways.
   k. Installation of permanent stabilization practices as soon as possible after final grading.

7. Contractor shall submit amendments to ECIP in a written format acceptable to the Engineer if any changes to the ECIP are desired during construction. ECIP amendments shall be submitted prior to implementing changes or within 48 hours of implementation if allowed by Engineer.

8. Identification of waste site is required. If the waste site is not a licensed pit, provide the following information:
   a. Name of owner
   b. Address and/or location description
   c. Site plan on an aerial photo or contour map illustrating requirements of 5a through 5e.
   d. In the case the waste site will disturb over one acre, provide proof of coverage for WDNR WPDES General Stormwater Permit for Construction Sites.

Save... Print... Clear Data

State of Wisconsin
Department of Natural Resources (DNR)
PO Box 7921, Madison WI 53707-7921
dnr.wi.gov

CONSTRUCTION SITE INSPECTION REPORT

Form 3400-187 (R 11/16)

Notice: This form was developed in accordance with s. NR 216.48 Wis. Adm. Code for WPDES permittees' convenience; however, use of this specific form is voluntary. Multiple copies of this form may be made to compile the inspection report. Inspections of the construction site and implemented erosion and sediment control best management practices (BMPs) must be performed weekly and within 24 hours after a rainfall event 0.5 inches or greater.

Construction Site Name and Location (Project, Municipality, and County):	Site/Facility ID No. (FIN):
Onsite Contact/Contractor:	Onsite Phone/Cell:

Note: Inspection reports, along with erosion control and storm water management plans, are required to be maintained on site in accordance with s. NR 216.48 (4) and made available upon request. PLEASE PRINT LEGIBLY.

Date of inspection:

Time of inspection:
Start: ◯ am ◯ pm
End: ◯ am ◯ pm

Type of inspection: ◯ Weekly ◯ Precipitation Event ◯ Other (specify)

Weather/Site Conditions:
◯ Dry ◯ Frozen or snow covered
Temp. °F Antecedent Soil Moisture ◯ Variable ◯ Frozen (Thaw predicted in next week)
◯ Wet ◯ Melting Snow/slush
Last Rainfall Depth: inches
Last Rainfall Date:

Describe current phase of construction:

Scheduled Final Stabilization Date for Universal Soil Loss Equation (USLE) [1] :

Project on Schedule[2]? ◯ Yes ◯ No

Name(s) of individual(s) performing inspection:

Inspector Phone/Cell:

I certify that the information contained on this form is an accurate assessment of site conditions at the time of inspection:

Inspector Signature _____ **Date:** _____

Inspection Questions:	Yes	No (Identify Actions Required):	Location/Comments:	Actions Completed by Date & Initials
1. Is the erosion control plan accessible to operators?	☐	☐ Provide onsite copy		
2. Is the permit certificate posted where visible?	☐	☐ Post certificate		
3. Is the current phase of construction on sequence with the site-specific erosion and sediment control plan, including installation/stabilization of ponds and ditches?	☐	☐ Add sediment control ☐ Install missing ditch/pipe/pond ☐ Stabilize bare soil		
4. Are all erosion and sediment control BMPs shown on plan properly installed and in functional condition?	☐	☐ Repair ☐ Modify ☐ Install/Replace		
5. Is inlet protection properly installed and functioning in all inlets likely to receive runoff from the site?	☐	☐ Clean ☐ Replace ☐ Install		
6. Is the air free of fugitive dust resulting from construction activity and bare soil exposure?	☐	☐ Apply water ☐ Apply dust control product		

[1] The Universal Soil Loss Equation (USLE) model and the Construction Site Soil Loss and Sediment Discharge Guidance are available at: http://dnr.wi.gov/topic/stormwater/standards/const_standards.html

[2] If the project is not on schedule then the soil loss summary for the project should be reviewed and schedule, plan or practices modified accordingly.

CONSTRUCTION SITE INSPECTION REPORT
Form 3400-187 (R 11/16)

Inspection Questions:	Yes	No (Identify Actions Required):	Location/Comments:	Actions Completed by Date & Initials
7. Is the public right of way curb line free of tracked soil and accumulation?	☐	☐ Install tracking pad ☐ Widen/lengthen pad ☐ Amend stone/Add geotextile ☐ Install wheel washing station ☐ Close entrance/exit ☐ Limit traffic across disturbed areas ☐ Sweep road and curb line		
8. Are wetlands, lakes, streams, ditches, or storm sewers downstream of the site free of sedimentation and turbid water leaving the site?[3]	☐	☐ Repair/Replace erosion control ☐ Add sediment controls ☐ Modify operations ☐ Contact DNR to verify extent of cleanup required		
9. Is dewatering and/or vehicle and equipment washing being done in a manner that prevents erosion and sediment discharge?	☐	☐ Install treatment train ☐ Install energy dissipation ☐ Modify discharge location ☐ Modify intake to reduce sediment		
10. Are soil stockpiles existing for more than 7 days covered and stabilized?	☐	☐ Seed ☐ Install mat/mulch/polymer ☐ Cover with tarp/plastic sheeting		
11. Are downstream channels and other downhill areas protected from scour and erosion?	☐	☐ Install energy dissipation at outfall ☐ Install ditch checks ☐ Install slope interruption ☐ Install onsite detention		
12. Are good housekeeping practices or treatment controls in place to prevent the discharge of chemicals, cement, trash, and other materials into wetlands, waterways, storm sewers, ditches, or drainage-ways?[4]	☐	☐ Properly dispose of trash ☐ Provide concrete washout station ☐ Contact DNR to verify extent of cleanup required		
13. Is the plan reflective of current site operations and does it address all erosion and sediment control issues identified during the inspection?	☐	☐ Revise sequence ☐ Revise sediment control BMP ☐ Revise erosion control BMP ☐ Revise post-construction storm water BMP		
14. Are all areas where construction has temporarily ceased (and will not resume for more than 2 weeks) temporarily stabilized?	☐	☐ Topsoil & seed ☐ Install mat/mulch/polymer ☐ Cover with tarp/plastic sheeting		
15. Are all areas at final grade permanently vegetated or stabilized with other treatments?	☐	☐ Topsoil & seed ☐ Install mat/mulch/polymer ☐ Sod ☐ Install stone base		
16. Have temporary sediment controls been removed in areas of the site that meet the permit definition of 'final stabilization'?	☐	☐ Water to establish vegetation ☐ Repair or reseed areas ☐ Remove temporary practices		

3 If sediment discharge enters a wetland or waterbody, the permittee should consult with DNR staff to determine if sediment cleanup and/or additional control measures are required.

4 The permittee shall notify the DNR immediately via the spills hotline at (800)943-0003 of any release or spill of a hazardous substance to the environment in accordance with s. 292.11, Wis. Stats., and ch. NR 706, Wis. Adm. Code.

SECTION 321116
SUBBASE COURSES

P A R T 1 - G E N E R A L

SUMMARY
This work consists of the construction of a foundation course of granular material of designated quality on the prepared roadbed in reasonably close conformity with the lines, grades and sections shown on the plans.

P A R T 2 - P R O D U C T S

MATERIALS
The material furnished and used in the work shall consist of natural sand or a mixture of sand with gravel, crushed gravel, crushed stone or other broken fragmented material, and shall conform to Section 350 and 209 of the State of Wisconsin Standard Specifications for Highway and Structure Construction, current edition.

Use either Grade 1 or Grade 2 material, unless a specific grade is called out in the bid form or special provisions.

Material Testing Frequency
Provide one gradation test for the first 500 cubic yards, followed by one gradation test per every 3,000 cubic yards thereafter.

Source
Except as provided below for materials utilized from the project excavation, import subbase from commercial suppliers or borrow pits.

Rights in the Use of Materials Found on the Project
The Contractor, with the written approval of the Engineer, may use on the project such stone, gravel, sand or other material determined suitable by the Engineer, as may be found in the excavation and will be paid both for the excavation of such materials at the corresponding contract unit price and for the pay item for which the excavated material is used. Replace, at the Contractor's own expense, such material with other acceptable material all of that portion of the excavation material so removed and used which was needed for use in the embankments, backfills, approaches, or otherwise. Do not excavate or remove any material from within the project site which is not within the excavation limits as indicated by the slope and grade lines, without written authorization from the Engineer.

EQUIPMENT
Provide equipment and tools necessary for producing, handling, hauling and placing of the granular subbase course and for performing and maintaining all parts of the work, satisfactory as to design, capacity and mechanical condition for the purpose intended, on the job before the work is started. Repair, improve, replace or supplement any equipment which is not maintained

in full working order or which, as used by the Contractor, is inadequate to obtain the results prescribed, to obtain the progress and quality contemplated by the contract.

NONCONFORMING MATERIALS

Engineer may allow non-conforming materials to remain in place if found to be noncompliant with this specification after the material is placed. In such a case a price reduction as specified below shall be applied. Only one price adjustment will be applied to a given quantity of material. If the quantity in question is subject to more than one of the following adjustment conditions, then apply the adjustment with the greater price reduction.

Gradation:	
≤ 3% out on any sieve	5% price reduction
> 3% to ≤ 5% out on any sieve	20% price reduction
> 5% out on any sieve	Remove and Replace or 40% price reduction

Plasticity:	
Nonconformance identified before placement	nonconforming material must not be used
Nonconformance identified after placement	remove and replace or 50% price reduction

P A R T 3 - E X E C U T I O N

SUBGRADE

Prepared and maintain the subgrade upon which the subbase course is to be constructed to the required lines, grades, and section as shown in the Plans and as follows.

Do not place materials on a subgrade covered by ice or snow, or on a wet or soft subgrade, unless specifically directed.

Do not place subbase material on soft, yielding, or spongy subgrade. Excavate and backfill areas of soft, yielding, or spongy subgrade or otherwise treated as directed by the Engineer. If unacceptable stability is cause by excessive moisture, allow the materials to dry prior to compacting. When necessary, accelerate drying of such materials by aeration or manipulation by means of blade graders, harrows, discs or other appropriate equipment.

If request by Engineer to remove and replace yielding subgrade, excavation or backfill performed will be measured and paid for under pertinent contract items.

Do not place subbase material on a dusty subgrade where resulting conditions might cause contamination of the material or preclude utilization of the entire subbase for its intended purpose.

Placing

Place subbase course material upon the prepared subgrade in a manner to avoid as much as possible contamination of the course with soil or other foreign material.

Compact the material in accordance with the provisions of Section 312300. Standard compaction shall be applicable to this work, unless special compaction, as outlined in Section 312300, is specifically required by the plans or special provisions.

Shaping and Compacting

Provide motor graders or subgrade finishing machines used for shaping the subbase course of adequate design and have sufficient power to satisfactorily perform the shaping operations.

Provide compacting equipment of the static type or of the vibrating type, or both, and of a design and have sufficient mass or force to accomplish the requirements hereinafter set forth.

Perform leveling, smoothing and compaction operations shall progress with the placing of the material and, to the extent possible, the same day in which the subbase course material is placed. Shape and trim the completed course to the lines, grades and section called for on the plans or in the contract and so maintained, insofar as practical, during the life of the contract.

Remove and dispose rocks and other fragments in excess of the permitted maximum size.

Do not place loam, clay, silt, topsoil, or other earthy materials of a similar character on the surface or incorporated in the subbase course in order to expedite hauling, to carry traffic or for any other reason.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

Method of Measurement

The item of Granular Subbase is measured, as provided in the contract, by the cubic yard, by the ton or by the square yard (inch thickness) in place.

Where the cubic yard measurement is used, the granular subbase course material is measured in cubic yards of volume in its original position computed by the method of average end areas, with no correction for curvature or, if the Engineer elects, by the method of truncated prisms. Measurements will be taken after the necessary stripping or other preparation of the deposit has been performed. Notify the Engineer sufficiently in advance of beginning the removal of granular subbase course material to afford the Engineer sufficient time to make the necessary original measurements. No measurement or payment for any material removed prior to making such measurements will be completed.

Where the cubic yard measurement is used and where the quantity of granular subbase to be placed is of such a minor amount that, in the judgment of the Engineer, the measurement of such minor quantity by the above method would be impractical, the measurement may be made by the cubic yard in the vehicle. The capacity of each vehicle used for hauling the material will be determined by the Engineer. Such capacity will be determined to the nearest 0.1 cubic yard.

Subbase course materials measured by the ton, which contain total moisture in excess of seven percent when weighed, will have deducted from their measured mass, the mass of the moisture in excess of seven percent. The Engineer will determine the moisture content of the materials at such intervals as the Engineer deems expedient for proper determination. Determination of the moisture content of the materials will be based on and expressed as a percent of the dry mass of the materials. Furnish and deliver to the Engineer with each load a ticket showing the net mass of the load.

When the contract so provides, granular subbase course will be measured by the square yard of area in place for the finished thickness called for in the contract or ordered by the Engineer. For a subbase course with sloping sides, the computation of the square yards in place will be based on the mean width of the top and bottom of the course. Subbase course for side roads, private entrances and other miscellaneous areas will be measured similarly for payment.

Where subbase course is measured by the square yard in place, any addition ordered to correct for settlement of the earth subgrade will be measured on the basis of the inplace volume of such additions, converted to equivalent square yards.

Basis of Payment

The quantity of granular material, measured as provided above, will be paid for at the contract unit price per cubic yard, per ton or per square yard (inch thickness), for granular subbase, complete in place. That price shall be full compensation for furnishing, unless otherwise provided, excavating, loading, hauling, placing, shaping, watering and dust abatement, compacting, finishing and maintaining the granular subbase material, salvaging, and for all labor, tools, equipment and incidentals necessary to complete the work.

END OF SECTION

SECTION 321123
AGGREGATE BASE COURSES

P A R T 1 - G E N E R A L

SUMMARY
Use base course consisting of densely compacted sand and gravel composed of one or more courses or layers of coarse aggregate. Use either crushed gravel or crushed concrete or crushed stone or crushed asphaltic pavement along with fine aggregate and binder or filler. Blend as necessary to produce an intimate mixture of the required gradation and stability, constructed on the prepared foundation in accordance with the specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross-sections shown on the plans or established by the Engineer.

P A R T 2 - P R O D U C T S

MATERIALS
Base Aggregate Dense (3-inch, 1 ¼-inch, ¾-inch) will comply with the material requirements of Sections 301 and 305 of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, current edition.

Material Testing Frequency
Provide one gradation test required for the first 500 cubic yards, followed by one gradation test per every 3,000 cubic yards thereafter.

NON-CONFORMING MATERIALS
For materials placed and incorporated into the work and then found or determined to not meet this specification, the Engineer may after carefully evaluating the situation, including appropriate tests/results, allow non-conforming materials to remain in place and apply a price reduction. Only one price adjustment will be applied to a given quantity of material. If the quantity in question is subject to more than one of the following conditions, apply the adjustment with the greater price reduction listed below:

Gradation [(1)]:

≤ 3% out on any sieve	5% price reduction
> 3% to ≤ 5% out on any sieve	20% price reduction
> 5% out on any sieve	remove & replace, or 40% price reduction

[(1)] Do not apply these price reduction guidelines to Base Aggregate Dense, 3-Inch material (non-conforming 3-inch material, due to gradation, must be removed and replaced).

Fracture:

≤ 5% out of specification	5% price reduction
> 5% to ≤ 10% out of specification	20% price reduction
> 10% out of specification	remove & replace, or 40% price reduction

Wear, Soundness, Freeze-Thaw, or Plasticity:

For non-conformance of any degree remove and replace, or 50% price reduction

P A R T 3 - E X E C U T I O N

Construct base course to the width and section shown on the plans.

Foundation Preparation

Prepare the foundation, or resurface the previously placed base layer, as specified below, before placing base. Do not place base on foundations that are soft, spongy, or covered by ice or snow. Do not place base on frozen foundations unless the engineer approves otherwise. Water and rework or re-compact dry foundations as necessary to ensure proper compaction, or as the engineer directs.

Prepare and construct the foundation to uniform density throughout. Construct the foundation to the required alignment and cross-section with equipment and methods adapted for the purpose. After shaping and compacting, provide a smooth foundation, at required density, and at the proper elevation and contour, to receive the next course.

If necessary to properly accomplish blading or to eliminate or prevent conditions of non-uniform stability or density, scarify the area forming the foundation to a uniform depth.

Unless specified otherwise, fill all holes, ruts, and other depressions in the foundation with materials similar to those existing in the foundation. Excavate and remove high places to the required lines, grade, and section.

Excavate and backfill areas of yielding or unstable materials with the material the engineer directs.

Prepare the foundation to conform to the specifications for the specific subbase, base, or surface course constructed.

If the foundation is an earth subgrade, constructed under this contract or under a previous contract, prepare or restore the foundation by removing all vegetation; excavating and removing materials of any nature encountered above the required elevations; filling all depressions occurring below the required elevations; and smoothing, shaping, and compacting the subgrade to the required grade, section, and density.

If the earth subgrade construction was substantially completed under a previous contract, do not presume that the previously completed work conforms to the requirements under this section.

Compacted Thickness

Do not exceed the maximum compacted thickness 6 inches for any one layer. The maximum thickness may be exceeded if a layer is placed upon a loose sand subgrade which would otherwise displace or when vibrating or a combination of vibratory and static compaction equipment is used, the compacted depth of a single layer of the base course may be increased to

8 inches upon approval of the Engineer, or when constructing base course 3-inch, a maximum compacted layer thickness of 9 inches is allowed.

The work in general will proceed from the point on the project nearest the source of supply of the aggregate so the hauling equipment will travel over the previously placed material, and the hauling equipment routed as uniformly as possible over all portions of the previously constructed courses or layers of the base course.

Deposit material on the foundation or previously placed layer in a manner to minimize segregation and to facilitate spreading in a uniform layer of the required dimensions. If blending of materials is necessary to provide the required gradation and properties of the material, and is permitted to be done on the site, accomplish the blending by intermixing the aggregate and blending material by means of motor graders, discs, harrows or other equipment to produce a uniform distribution or gradation throughout the finished mixture. Avoid excessive manipulation or mixing which will cause segregation between the coarse and fine materials.

Compact a layer or course after it has been placed and spread to the required thickness, width and contour. Moisten material deficient in moisture content for readily attaining the required density to the degree necessary during compaction operations by means of approved equipment.

Unless otherwise required in the contract, compact each layer to the requirements for standard compaction.

When special compaction is specifically required by the Plans or special provisions, compact each layer to at least 95 percent of maximum density before the succeeding layer is placed. Determination of optimum moisture content and maximum density will be in accordance with AASHTO T 99, Method C (standard proctor), with replacement of the fraction of the aggregate retained on the 3/4 inch sieve with P-3/4 inch/R-4 material. Field determination of the density for special compaction of the completed base course will be in accordance with AASHTO T 191 or AASHTO T 238 for determining density of soil in place.

Rework all areas where required compaction is not obtained as necessary or deficient material removed and replaced with material that will yield the required results.

Prior to and during compaction operations, shape and maintain the material to the required dimensions and contour (to within 0.04 feet of the plan elevation) by motor graders or other suitable equipment. Keep the surface of each layer true and smooth at all times.

<u>Base as Foundation for Concrete Pavement</u>

Prepare the foundation for concrete pavement by restoring, preparing, and conditioning of unstabilized bases according to the requirements below for application by form or slip form methods.

For areas of the foundation that are impractical to prepare by machine methods, prepare these areas by hand methods satisfactory to the engineer.

Ensure that the foundation in all cases is in a moist but not saturated condition during concrete placement. Saturate the foundation with water, if required, not less than 6 hours before placing the concrete. If the foundation subsequently dries, moisten it by sprinkling water just before placing the concrete. Sprinkle the water to avoid forming pools.

Trim and shape the foundation for a concrete base or pavement for a width equal to the width of the intended pavement plus at least one foot on each side to approximately the required lines, grade, and cross-section; and then uniformly compact to the required density. Perform compaction with suitable rolling or other types of consolidating equipment. Unless specified otherwise, uniformly compact the foundation to not less than the density for standard compaction of earth subgrade, subbase, or base.

Complete preparing the foundation for at least 300 feet in advance of depositing concrete, unless the engineer allows otherwise.

Trim and smooth ruts and irregularities in the foundation surface caused by trucks or other equipment hauling aggregates. Compact these ruts and irregularities ahead of concrete placing operations. Excavate, fill with suitable material, and compact soft and yielding spots.

Constructing Shoulders

Construct base course of shoulders adjacent to pavement.

Construct the shoulders with base course material to conform to the elevation and typical section shown on the Plans, except for minor modifications which may be required to meet other work.

Perform the work in the proper sequence with surfacing or paving operations as hereinafter provided.

Use equipment in shouldering operations adequate in design and capacity to accomplish the required results and is subject to approval by the Engineer. Do not use equipment which by its design or its manner of operation will damage or mar the pavement or surfacing, curbs or appurtenances.

Insofar as practicable, place base course material directly on the shoulder area between the pavement edge and the outer shouldering limits indicated on the typical section. Recover uncontaminated material deposited outside the limits and place within the limits. If misplaced material is not recovered and placed on the shoulder, or becomes contaminated, deductions may be made for the estimated quantity of unrecovered or contaminated material, as determined by the Engineer.

Do not place shoulder material on the pavement or surfacing during placing, unless specifically permitted by the Engineer, and if so permitted, must not remain on the pavement overnight.

Spread and compact base course material as placed to the required density in layers not exceeding 6 inches in compacted thickness. Perform necessary shaping during compacting

operations so the resulting finished shoulder will conform to the required grade, slope and section. Broom off all littering of the pavement or surfacing with base material.

Shoulders Adjacent to Concrete Pavement

Complete construction of shoulders along concrete pavements in such a manner that the shoulder construction will be completed to approximate grade and cross section on each separate section of pavement as soon as such section has cured sufficiently to withstand hauling and placing operations. For the above purpose each daily pour of concrete is considered a section of pavement.

Shoulder Adjacent to Asphaltic Surfaces

Complete construction of aggregate shoulders along asphaltic pavements including paved shoulders open to through traffic and where any wedge or course, or any combination thereof is 2 inches or more in thickness or where the thickness of such course plus the depth of the existing drop-off at the pavement edge including paved shoulders is 2 inches or more, in a manner that the shoulder is constructed to the required cross section and flush with the surface of the placed asphaltic surfacing including paved shoulders within 48 hours following the placing of such asphaltic work. Provide and maintain low shoulder or pavement drop off signing and other traffic protection and control devices through such low shoulder areas until the shoulder is constructed to the required cross section and flush with the surfacing.

Maintenance

Maintain the base course until accepted.

Dust Abatement

Minimize the dispersion of dust from the base course, including shoulders, during construction and maintenance operations by the application of water or other approved dust control materials as provided in the contract or required by the Engineer.

Stockpiles

Under the item of base course, the right is reserved to order approximately five percent of the quantities bid upon placed in stockpiles within the limits of the right of way or project site at locations designated by the Engineer.

Clear and prepare the area to be covered by each stockpile to facilitate the recovery of the maximum amount of stockpiled material. Shape and trim stockpiles present a neat appearance.

METHOD OF MEASUREMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

The item base course is measured as provided in the contract by the ton, in the vehicle by the cubic yard or in-place and compacted by the square yard. The quantity measured for payment is

the amount of material required and incorporated in the work or placed in stockpiles in accordance with the contract.

Aggregates, measured by the ton, obtained from wet pits or which contain total moisture in excess of seven percent, unless stockpiled, aerated or dried to reduce the moisture content to seven percent or less before being weighed, will have moisture content in excess of seven percent deducted from the measured mass. Determination of the moisture content of the aggregates will be based on and expressed as a percent of the dry mass of the aggregates.

When aggregates are measured by the ton, furnish and deliver to the Engineer a ticket with each load showing the net mass of the load, the type of material, the date and project where used.

For material measured by the square yard, the Engineer will only measure areas placed to the thickness the contract specifies or the Engineer directs. For subbase with sloping sides, the Engineer will compute area based on the mean width of the top and bottom of the layer. The Engineer will measure additions ordered to correct for settlement of the earth subgrade based on the in-place volume converted to an equivalent area.

ALTERNATE MEASUREMENT PROCEDURES

Conversion of Mass to Volume

In lieu of measuring the aggregate items by volume in the vehicle at the point of delivery, the cubic yard measurement may be obtained by weighing the material and converting the mass into cubic yards.

At least once during each regular production day, select, weigh, and haul a load of material to a point of delivery representative of the day's production, and then measure by volume in the vehicle. The mass-volume factor thus determined will be used to convert the day's accepted weighed production into cubic yards.

Conversion of Volume to Mass

In lieu of weighing minor amounts of aggregate items, the ton measurement may be obtained by measuring the material by volume in the vehicle at the point of delivery and converting the volume into tons. For the purpose of this procedure, a minor amount will be 1000 tons or less.

At least once during each regular production day, select and haul a load of material to a point of delivery representative of the day's production, measure in the vehicle and haul to an approved scale and weigh. The volume-weight factor thus determined will be used to convert the day's accepted production of such minor amount into tons. The frequency of determining such factor may be revised if deemed desirable by the Engineer. Deductions will be made for moisture content as provided.

BASIS OF PAYMENT

The quantity of aggregate or pre-mixed aggregate and blended filler material for base course, measured as provided above, will be paid for at the contract unit price per ton or per cubic yard in the vehicle, or by the square yard (inch thickness) complete in place, which prices are full compensation for furnishing, producing, crushing, screening, loading, hauling, placing, watering

unless otherwise provided, drying and compacting; for maintaining; for preparing foundation for dust abatement, unless otherwise provided; for stockpiling, if required; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

Engineer may deduct the quantity of base placed outside the lines or grades required by the Plans, unless placed at Engineer's direction.

Should excavation below subgrade (EBS) be required in an area of completed base construction, the excavation (including excavating the base) will be measured and paid for as Excavation Common. Stockpiling, respreading, compacting and shaping of the base to the plan grade and cross-section in the area of EBS will be considered incidental.

END OF SECTION

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SECTION 321600
CURB, GUTTERS, SIDEWALKS, AND DRIVEWAYS

P A R T 1 - G E N E R A L

SUMMARY
This work consists of constructing concrete curb, gutter, curb and gutter, sidewalks, steps, landings and driveways with or without reinforcement, of the dimensions and design as indicated, placed in one course on the prepared foundation or base, at the locations and to the required lines and grades, all as shown on the Plans and provided by the Contract.

SUBMITTALS
Prior to mixing of concrete, submit to the Engineer for review a proposed concrete mix design for all the various types of concrete specified and/or scheduled.

Include proportions, materials, manufacturer's name, and catalog number for items such as Portland cement, admixtures, and name of ready-mix supplier.

Ready-mix delivery tickets:

a. Maintain a record at the job site showing date, time, and place of each pour of concrete together with ready-mix delivery tickets certifying contents of the pour.

b. Make the record available to the Engineer for inspection upon request. Upon completion of the work, deliver the record and the delivery tickets to the Engineer.

QUALITY ASSURANCE
Any material or operation specified by reference standards (i.e., Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, current edition), industry standards, commercial standards, other government standards, or other published standards will comply with the requirements of the standards listed. Where the project specifications are more stringent than the references standard, the project specifications will govern.

Ready-Mixed Concrete: All ready-mixed concrete will be furnished by an approved supplier whose plant is approved by the Wisconsin Department of Transportation.

P A R T 2 - P R O D U C T S

MATERIALS
Furnish materials conforming to the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, current edition (WisDOT Spec).

Provide Grade concrete conforming to Section 501 of WisDOT Specification.

All concrete will be air entrained to percentages listed in Section 501.

Concrete slump will be in accordance with Section 501.

Concrete for sidewalk, curb and gutter, driveway, and aprons will have a 28-day compressive strength of 4000 psi. If necessary adjust WisDOT section 501 proportions to achieve required 28-day strength.

Concrete placed after October 15th will not contain fly ash. The engineer may also suspend the use of fly ash before that date if extended cold periods are expected, such that proper curing of the concrete would be unobtainable.

NON-CONFORMING CONCRETE

If non-conforming material is allowed to remain as constructed, the Engineer will determine the quantity of non-conforming material. If the project is not constructed on the basis of a unit cost payment for work (e.g. lump sum project) the reductions listed herein will be applied to the material costs multiplied by a factor of 2.0. Only one price adjustment will be applied to a given quantity of material. If the quantity in question is subject to more than one of the following conditions, apply the adjustment with the greater price reduction.

Slump

0.25 inches out of specification.....	2% price reduction
0.50 to 0.75 inches out of specification.....	5% price reduction
1.00 to 1.75 inches out of specification.....	25 % price reduction
2 inches or more out of specification	Remove & replace or 50% price reduction

Apply price reductions to results of slump tests only. If the Engineer elects to take a slump test for slip form pavement, do not take a price reduction if both of the following are met:

1. Result of slump test is less than 4 inches.
2. Pavement meets edge slump spec as defined in WisDOT Standard Specifications.

Air Content

0.5 % or more above specification.....	10% price reduction
0.1 % to 0.4% above specification.....	5% price reduction
0.1 % to 0.5% below specification.....	20% price reduction
0.6 % to 1.0% below specification.....	30% price reduction
More than 1.0% below specification.....	Remove and replace or 50% price reduction

Time Limit

Use of concrete after time limit exceeded.....	25% price reduction

Gradation

If air, slump, and strength (if applicable) meet specifications, but aggregates are non-conforming, apply one of the two following price reductions:

1. 10% price reduction on the cubic yard cost of the aggregate material invoice price
2. 5% price reduction on the bid item unit price, if the aggregate invoice price is not available

P A R T 3 - E X E C U T I O N

GENERAL

Preparation of Foundation

Prepare foundation by excavating or filling to the lines, grades and cross section shown on the Plans and required for placing the concrete and/or subbase as shown on the Plans. Remove and replace with suitable material soft or unsuitable material underlying the proposed curb, gutter, sidewalk, or paved areas. Compact all foundation materials thoroughly and finish to a firm, true surface. In cuts, construct foundation sufficiently wide to permit placing of forms and performing the required work of placing the concrete and finishing. On embankments, construct the foundation at least 2 feet wider than the proposed sidewalk and extending not less than 1-foot beyond each edge of the concrete. Fill all holes, ruts and other depressions in the foundation with materials similar to those existing in the foundation, or the Contractor may elect to use granular subbase or dense aggregate base course in which case there will be no additional compensation for such item. Thoroughly moisten the foundation immediately prior to placing the concrete.

When indicated on the Plans, place granular subbase or base course under the concrete masonry at the locations, thickness and section shown on the Plans.

Concrete will not be placed on frozen base or subgrade.

Cease concreting operations when there is insufficient natural light, unless an adequate and approved artificial lighting system is provided and operated.

Forms will be of wood or metal and will be straight and have sufficient strength to resist springing, tipping or other displacement during the process of depositing and consolidating the concrete. The forms will be of the full depth of the required concrete sections and will be designed to permit secure fastening. Construct and shape face boards, if used, that their lower edge conforms to the lines and radius indicated by the cross section for the pertinent structure as shown on the Plans. Use flexible or curved forms of proper radius for curves of 100 ft. radius or less. Clean thoroughly all forms and oil surfaces prior to concrete placement.

Deliver ready-mixed concrete to the site of the work and completely discharge from the transporting vehicle, other than non-agitating types, within the following time limits or batch lives commencing with the introduction of the mixing water to the cement or the cement to the aggregates:

When the atmospheric temperature at time of placement is less than 60° F ..... 1½ hours

When the atmospheric temperature at time of placement is 60° F or higher..... 1 hour

Should the Contractor elect to add an approved retarder to the concrete mixture when the atmospheric temperature is 60° F or higher, the time limit may be extended to ..... 1½ hours

These times may be reduced by the Engineer or inspector under conditions contributing to quick stiffening of the mix, or during cold weather when loss of heat occurs to such an extent that the concrete will not be at the proper temperature when placed.

Except during the mixing revolutions, the drum or agitator of the vehicle will operate at agitating speed until discharge of the mix.

Mixers and Mixing

When concrete is mixed in a truck mixer, each batch will be mixed not less than 70 or more than 110 revolutions of the drum or blades at the rate of rotation designated by the mixer manufacturer as mixing speed. Additional revolutions, if any, will be at the speed designated by the manufacturer as the agitating speed. All materials, including mixing water, will be in the mixer drum before mixing revolutions are started.

Add mixing water at the batching plant; if additional mixing water is required to obtain the specified slump, water may be added with the permission of the Engineer. The total of all free and added water will not be in excess of that permitted elsewhere in section 501 of the WisDOT Specifications. If additional water is added at the site of the work, a minimum of 20 revolutions is required of the truck mixer at mixing speed before discharge of any concrete. Complete additional adding water and mixing at the site of the work within 45 minutes after the original introduction of the mixing water to the cement or the cement to the aggregates. This time may be extended by the Engineer to 75 minutes for those grades of concrete for which the delivery time limit is 1½ hours. When additional revolutions at mixing speed are required because of water added at the site, the total revolutions at mixing speed will not exceed 110.

Equip truck mixers with an approved revolution counter and, unless also equipped with an accurate and dependable device or counter which will indicate and control the number of revolutions at mixing speed, complete mixing at the job site or at the batching plant and operate the mixing unit at agitating speed between the plant and job site.

Material Testing

Quality control testing is the responsibility of the contractor to complete. Complete testing by personnel experienced in the WisDOT procedures for testing concrete and aggregates. Quality control testing includes test specimens cast to determine strength for form removal, construction traffic loading, and opening to traffic. Quality control testing is required to assure the Owner that the work completed is meeting the requirements of the specifications. Provide a copy of all test results to Engineer.

Perform random QC testing at the following frequencies:

1. Test air content and slump at the start of each day's operation within the first two loads of placement.
2. In addition to the startup test, perform additional test for air content and slump and cast one set of 3 cylinders a minimum of once per 100 cubic yards for each mix grade and placement.
3. Slump tests are waived on slip formed placement.

Complete entrained air tests made at the site in accordance with ASTM C231. This includes using properly calibrated pressure-type air meter. Tests for air entrainment for concrete placed by pumping at the point of discharge from the pump line.

Submit tests results to the Engineer.

Each set of test cylinders will consist of 3 cylinders. The cylinders will be kept in a 60 to 80 degrees Fahrenheit temperature range and protected from moisture loss at the job for a period of 24 to 48 hours. They will be carefully delivered to the lab, lab cured and tested 28 days. Two cylinders will be broken at 28 days and the compressive strength for acceptance will be the average of the two breaks. The third will only be tested if there is significant deviation in the two 28-day tests, and at least one test fails.

Additional cylinders may be cast by the Contractor as deemed appropriate for determining when local traffic may use or cross the new concrete surface without harming it.

Engineer, or representative designated by Owner, will complete quality verification testing. The rate of verification testing will be determined by the Engineer, but will generally follow the following frequencies:

1. One slump test, air content, and set of 3 test cylinders cast a minimum once per day and one per every 200 cubic yards of concrete placed per day.
2. Ancillary placement quantities of less than 15 CY may be exempt from the verification testing and casting of test specimens at the discretion of the Engineer. Provide documentation verifying that an approved WisDOT mix design was used for all ancillary placements.

Cold Weather Pours

Placement of concrete will occur only when outside air temperatures at the time of placement is at least 40°F and rising. If temperatures within the resulting 48 to 72 hours after placement are expected to drop below 40°F, install protective covering as defined below. If either of these temperature conditions are applicable, concrete mixture will be placed at a minimum temperature of 55°F and covered as quickly as possible after finishing operations have been completed. If necessary to maintain placement temperature, aggregates and/or mix water may be heated according to WisDOT 415. The cement will not be heated, nor will salt or chemical admixtures be added to the concrete mix to prevent freezing.

CURING AND PROTECTION OF CONCRETE

Construct suitable and substantial temporary crossings to bridge over the concrete necessary to provide for traffic across the curb and gutter or sidewalk at all locations designated on the Plans or in the Contract or to provide access to adjacent parcels if required in the specifications. Structures will be of sufficient length to span the concrete so no load will be transmitted to the new concrete masonry. Required materials for temporary crossings will be available at the site before the curb and gutter is placed construct crossovers as soon as practicable after the concrete is placed and finished.

In lieu of the above temporary crossings, gaps to provide for the passage of traffic may be left in the curb and gutter or sidewalk, if permitted by the Engineer. Complete placement of concrete in gap areas after previously placed adjacent concrete has sufficiently cured to carry traffic.

Replace concrete damaged by traffic or otherwise damaged prior to its acceptance at the expense of the Contractor in a manner satisfactory to the Engineer. Protect the concrete masonry against both public traffic and the traffic caused by the Contractor's own employees and agents.

Protect the unhardened concrete against damage by rain. When rain is imminent, cover the unhardened concrete immediately with paper, plastic film or other suitable material, and planks or forms placed along slip-formed pavement edges.

Cure concrete by the impervious coating method outlined in WisDOT Section 415. Curing compound will conform to WisDOT Section 415.

Protect the concrete as specified in WisDOT Section 415, except that the Engineer may allow the Contractor to open sidewalks to pedestrian traffic after the concrete has developed sufficient strength to prevent damage to the surface.

Protective Covering for Cold Weather Pours

Protective covering materials will conform to WisDOT 415 except for the following temperature and thickness requirements.

The protective covering may consist of 12 inches of straw between two layers of polyethylene, or an approved equivalent curing blanket, providing the same level of thermal protection. Monitor the surface temperature of the concrete at locations determined by the Engineer. Maintain a surface temperature of 55°F for an initial set period of 72 hours after placement. If Type III cement is substituted or cement content is increased 100 pounds per cubic yard from the normal specification, protection is required for 48 hours. At no time should the surface temperature exceed 120°F.

Prevent freezing of the concrete until it has developed sufficient strength to open it to service. Remove and replace any concrete damaged by freezing or frost action during the first seven days following its placement at no cost to the Owner.

Opening to Service

Maintain moisture, temperature, and physical protection for concrete until it develops sufficient strength to open it to service.

The Engineer will allow the contractor to open concrete surfaces to construction and public traffic when the concrete attains a verified compressive strength of 3500 psi. Without compressive strength information, the Engineer may allow the contractor to open the affected structural masonry after the following minimum times as adjusted for concrete surface temperature.

APPLICATION EQUIVALENT CURING DAYS

High early strength concrete - 4
General purpose concrete, grade A - 5
General purpose concrete, grades A-FA, A-S, A-T, A-IS, A-IP, and A-IT - 7

The equivalent curing day is based on a daily average concrete surface temperature of 60°F. Calculate the daily average concrete surface temperature by taking the average of the high and low temperatures at the least favorable location of the affected concrete unit, as verified by the Engineer, for each day. If this daily average concrete surface temperature falls below 60°F, then equivalent curing days accumulate at a reduced rate. Use the following guidelines to calculate equivalent curing days; for a daily average concrete surface temperature of:

1. 60°F or more; accumulate one equivalent curing day per calendar day.
2. 40°F to less than 60°F; accumulate 0.6 equivalent curing day per calendar day.
3. Less than 40°F; no curing credit is accumulated.

Opening Strength

Determine opening strength and provide the Engineer with the information required to verify that strength by one or a combination of the following methods:

1. Compressive strength testing of cylinders.
2. Maturity method.

The resulting opening strength, when the engineer verifies, will apply to concrete on the same project conforming to the following criteria:

1. Of the same mix design as the test location.
2. Cured under similar or more desirable conditions.
3. Placed on or before the test location.

If both direct compressive strength test results and maturity data are not available, the Engineer may estimate compressive strength based on test results of concrete of the same mix design placed adjacent to and under similar conditions on the same project.

Compressive Strength Testing of Cylinders

Submit the compressive strength test results to the Engineer for verification. Compute the opening strength as the average of compressive strength test results for 2 cylinders. If the strength of a cylinder is less than 90 percent of the required strength, the Engineer will reject the resulting average. Field cure cylinders under conditions similar to those prevailing for the structural masonry unit they represent.

Fabricate cylinders according to AASHTO T23 and test the cylinders according to AASHTO T22.

Maturity Method

Develop a strength/maturity relationship for each concrete mix design. Base that relationship on the strength of cylinders from concrete incorporated into the work. Submit the maturity data to the Engineer for approval before placing more concrete using that mix design. Develop a new strength/maturity relationship every time the mix changes or if Engineer verification cylinder strength varies more than 10 percent from the required opening strength when tested at the calibrated opening maturity.

Conform to WisDOT Construction Materials Manual Chapter 8 for strength/maturity relationship development, field verification of the resulting curves, and maturity testing. Use a default datum temperature of 32°F or use a mix-specific datum temperature determined according to Annex A1 of ASTM C1074. Develop data points for the strength/maturity relationship up to 120 percent of the required opening strength.

Place at least one sensor for each 2,000 square yards of concrete pavement and one sensor for each 100 cubic yards of concrete placed under non-pavement bid items. The resulting maturity, after engineer verification, will apply to concrete on the same project conforming to the following:

1. Of the same mix design as the test location.
2. Cured under conditions similar to or more favorable than that of the test location.
3. Placed on or before the time the test location was placed.

Each work week, provide a set of 3 verification cylinders to the Engineer for each strength/maturity field calibration curve currently in use on the project. The Engineer will designate the sampling location for these verification cylinders. Provide 2 cylinders for compressive strength testing and one with a data encrypted sensor embedded in its center for maturity evaluation. Cast and cure these cylinders on-site as the Engineer directs and conform to the requirements of ASTM C31 for field curing. Deliver the 2 compressive strength cylinders to the Engineer after attaining 50 percent of their opening maturity. Notify the Engineer promptly when the instrumented cylinder reaches the opening maturity so the Engineer can perform verification testing as closely as possible to that opening maturity level.

CURB AND GUTTER

Placing Concrete

The Contractor may, with the approval of the Engineer, elect to use a machine for placing, forming and consolidating curb and gutter. If a machine is used, the resulting curb and gutter will be of such quality as to equal or exceed that produced by formed methods. Machine placed concrete curb and gutter will be hand trowel finished before broom finishing.

Securely anchor concrete curb and gutter, unless constructed integrally with concrete pavement, to adjoining concrete pavement by placing specified tie bars when and as shown on the Plans.

Use driven tie bars to tie new concrete curb and gutter to old in-place concrete pavements. Do not use driven tie bars in lieu of cast in place tie bars in construction joints of pavement and curb and gutter placed under the Contract.

When concrete curb and gutter is placed adjacent to existing asphalt pavement, sawcut existing asphalt pavement a minimum of 1 foot from the proposed flag of the gutter.

Contraction joints may be formed by sawing or by forming an induced plane of weakness at least 2 inches in depth in the curb and gutter directly opposite all construction or contraction joints in abutting concrete pavement and at the required spacing in curb, gutter, or curb and gutter adjoining asphaltic pavement. Such spacing will be approximately 6 feet to approximately 10 feet in length, but never less than 5 feet, as directed by the Engineer. Curb end taper sections (typical length 3 feet) are not subject to the minimum 5 foot joint spacing requirement.

The depth of cut and equipment used in sawing will meet the approval of the Engineer. Complete sawing as soon as practicable after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking takes place in the concrete. If this method results in random cracking, the Contractor will be required to form an inducted plane of weakness.

Separators, if used, will be removed as soon as practicable after the concrete has been struck off, consolidated and set sufficiently to preserve the width and shape of the joint. Face forms, if used, may be removed for finishing curb face and fillets as soon as the concrete will retain its shape. Back forms may be removed after the concrete has been in place for six hours.

Finishing

Thoroughly trowel and brush the face surfaces of the curb and gutter. Round edges at the back edge of the curbs, the edge of the gutter adjacent to the pavement and edges adjacent to expansion joints or induced contraction joints with an edger of ¼-inch radius, unless noted otherwise in the plans. Point with mortar any honeycombed areas occurring along forms on back of curbs or edges of gutters.

Expansion Joints

Place expansion joints in curb and gutter constructed adjacent to asphaltic surfacing. Locate joints at all locations where tangent and radial curb or curb and gutter meet, on each side of every inlet about 3 feet from the inlet but not closer than about 6 feet from another joint and on tangent sections at a maximum spacing of 295 feet and a minimum spacing of 6 feet.

When curb and gutter is constructed adjacent to or on portland cement concrete pavement constructed with expansion joints, place expansion joints in the curb and gutter to match the locations of the expansion joints in the pavements.

Set joints at right angles to the face and top of the curb and at right angles to the flow line and surface of gutters. The joint filler will be ¾-inch wide.

SIDEWALK

The foundation, forms, and reinforcement when required, will be checked and approved by the Engineer before the concrete is placed. Place concrete on a moist foundation, deposited to the required depth, and consolidated sufficiently to bring the mortar to the surface, after which it will

be struck off and finished to a true and even surface. The final floating will be done with a wooden float. Before the mortar has set, the surface will be brushed or lightly broomed. Before the concrete is given the final surface finish, the surface of the walk will be checked with a 10 foot straightedge, and any areas which show a variation or departure from the testing edge of more than ¼ inch will be corrected by adding or removing concrete as necessary while the concrete is still plastic.

Concrete sidewalks may be constructed with suitable, approved slip-form equipment when permitted by the Engineer. The wood floating may be omitted when a suitable finish is produced by the slip-form equipment.

Curb ramps will be constructed at the locations and in accordance with the details and dimensions shown on the Plans.

Reinforcement

Where reinforcement is required, it will conform to and be placed in accordance with the details shown on the Plans.

Joints

For sidewalks of uniform width, construct transverse joints at right angles to the sidewalk centerline, and construct longitudinal joints parallel to the centerline, unless specified otherwise. For sidewalks of variable or tapering widths, make the transverse and longitudinal joints at right angles to each other; if possible, review joint layout in the field with the Engineer.

Use contraction joints to divide the sidewalk into sections.

Place 1/2-inch wide transverse expansion joint filler through the sidewalk at uniform intervals not greater than 96 feet apart.

Place 1/2-inch wide expansion joint filler between the sidewalk and back of abutting parallel curb or gutter; and place one-inch wide expansion joint filler between sidewalk and buildings or other rigid structures.

Place 1/2-inch wide expansion joint filler between sidewalk approaches and the back of curb or gutter or edge of pavement.

No joint may deviate more than 5 degrees from perpendicular to the surface of the finished. Ensure that joint axes do not deviate more than 1/2 inch from a straight line, or from the designated alignment at any point. If constructing the joints in sections, do not use offsets or concrete struts between adjacent units.

If constructing the sidewalk in partial width slabs, place transverse joints so they match the like joints in adjacent slabs. If widening existing sidewalks, place transverse joints in line with like joints in the existing sidewalk.

If possible, do not divide sidewalks into sections less than 3 feet, or greater than 12 feet in any dimension. Produce the unit areas by using metal slab division forms extending to the concrete's full depth, or by contraction joints, as specified below.

A contraction joint in sidewalk may consist of a slot or groove, at least one inch deep and 1/4 inch wide. Form them by inserting a metal parting strip in the concrete after striking off and consolidating, and while the concrete is still plastic. As soon as the concrete retains its shape, remove the parting strip and edge finish the joint.

The contractor may form contraction joints by cutting the concrete not less than 1/4 of the depth through with a pointed trowel or other suitable tool. Edge-finish the joint.

The contractor may saw sidewalk contraction joints at least one inch in depth and approximately 1/8 inch wide. Perform the sawing as soon as possible after the concrete sets sufficiently to prevent raveling during sawing and before shrinkage cracking occurs.

Extend the expansion joint filler to the concrete's full depth and make the top slightly below the finished surface of the sidewalk.

For sidewalk, consolidate the concrete thoroughly at expansion joint faces to fill the voids, and finish the surface smooth and true to grade. Also round sidewalk edges along forms, un-sawed joints, and metal slab division forms with a 1/2-inch radius edger. For all other work under this section, use mechanical vibration at expansion joint faces to fill the voids, and finish the surface smooth and true to grade.

Do not seal joints.

Backfilling and Restoring the Site of the Work

Backfill spaces along the sides with satisfactory soil and thoroughly compact where the sidewalk does not abut curb, curb and gutter, pavement or other structures and when the concrete in such sidewalk has been cured and the forms removed. The backfill will conform to the section shown on the Plans. Dispose surplus excavation and restore the site of the work to a neat and orderly condition.

Steps

Build steps and landings, if required, at the locations and in accordance with the design, dimensions and details shown on the Plans. Include reinforcement and necessary excavation, backfilling and disposal of excess material from excavation. Formed surfaces of landings, risers and side of steps will receive a rubbed surface finish.

Driveways and Alleys

Longitudinal joints where shown on the Plans will be construction joints unless otherwise authorized. Place expansion joints where the driveway or alley abuts a pavement or sidewalk.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

Curb and Gutter

Measure curb and/or gutter, completed in accordance with the terms of the Contract, by length in feet along the base of the curb face or along the flow line of the gutter and such measurement will be continuous along such line extended across driveway and alley entrance returns or ramps. No deduction in length will be made for drainage structures installed in the curbing such as inlets, etc.

All excavation required for and performed during construction of curb, gutter, or curb and gutter, when covered by a bid item in the contract, will be measured for payment as provided in the specifications; however, when the contract does not provide a bid item for excavation, such work required and performed will not be measured for payment, but will be considered as subsidiary to and a part of the item of curb, gutter, or curb and gutter, as the case may be.

The quantity, if measured individually as provided above, will be paid for at the contract unit price per lineal foot for the items of concrete curb and/or gutter (size, type), as the case may be. Price is full compensation for all excavation and preparation of foundation and all special construction required at driveway and alley entrances or curb ramps; for furnishing all materials, including concrete masonry, expansion joints, and reinforcement tie bars unless otherwise provided; for placing, finishing, protecting and curing; for sawing of joints; and for all labor, tools, equipment and incidentals necessary to complete the work, including disposal of surplus material from excavation and restoring the site of the work provided, however, that where the contract provides a bid item for excavation, such item of work required for construction of curb, gutter, or curb and gutter will be paid for as provided in the contract.

Sidewalk

Measure sidewalks including curb ramps and steps including landings, by area in square feet and the quantity measured for payment will be the amount actually completed and accepted in accordance with the terms of the Contract, computed from dimensions as shown on the Plans or as altered by direction of the Engineer.

In the case of steps including landings, the area measured for payment is the summation of the areas of the treads and landings, computed by multiplying the width of the tread and landing by the length of the tread and landing.

The area, if measured as provided above, will be paid for at the contract unit price per square feet for the items of concrete sidewalk including curb ramps, or concrete steps including landings, as the case may be, which price will be full compensation for furnishing all materials, including concrete masonry, reinforcement and expansion joints; for all excavation and preparation of foundation, backfilling and disposal of surplus material; for placing, finishing, protecting and curing; and for all labor, tools, equipment and incidentals necessary to complete the work and

restore the site of the work provided, however, that when the contract provides a bid item for common excavation, such work required and performed in the construction of concrete sidewalks will be paid for as provided in the contract.

Drives and Alleys

Measure concrete driveways and concrete alleys by the area in square feet and the quantity to be paid for is the number of square feet of concrete driveway or alley completed and accepted.

Concrete driveways and concrete alleys will be paid for by the square feet, if measured as provided above, and will be paid for at the contract unit price per square feet for concrete drives, which price will be full compensation for furnishing, hauling, preparing, placing, curing and protecting of all materials, including cement, concrete masonry, joints and joint materials, dowels and tie bars, unless otherwise provided; for preparing foundation, unless otherwise provided; for filling core holes; and for all labor, equipment, tools and incidentals necessary for constructing the pavement complete, including reinforcement.

END OF SECTION

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SYNTHETIC GRASS OUTDOOR SURFACE SPECIFICATIONS: K9GRASS CLASSIC

1.01 DESCRIPTION OF WORK: The contractor shall provide all labor, materials, equipment and tools necessary for the complete installation of a "no in-fill" synthetic grass dog surface with a stable draining base. The complete synthetic grass system shall consist of, but not necessarily be limited to, the following:

A. Area of construction with the extent of artificial turf work as shown on the drawings.

B. Subgrade, base, and drainage construction as specified in Section 2 and Section 3 of this document.

C. Quality synthetic grass product manufactured in the USA according to specifications in Section 2 of this document. Product shall be a knitted synthetic grass product (not tufted) and contain an antimicrobial agent while meeting or exceeding all guidelines as established herein. For characteristics not specifically stated, shall meet or exceed all guidelines published by the Synthetic Turf Council.

D. The synthetic grass surface shall be specifically designed, manufactured and installed for the intended use as a commercial/high use dog surfacing solution.

E. Plastic perimeter boards (typically 2" x 4" set vertically) are to surround the entire area for anchoring of the turf. The top edge of this surface is to be a minimum of ½" below any adjacent solid surfaces where there could be foot traffic.

F. Stainless steel staples, 1" in length, are to be used to anchor the synthetic turf to the perimeter boards.

1.02 SYSTEM PERFORMANCE: Contractor shall ensure that products for pet/dog system meet the following performance requirements:

A. The components, as well as the installation methods utilized, shall be designed and executed in a manner to hold up to the unique challenges dogs present. The materials as hereinafter specified shall withstand full climatic exposure in the location of the play yard/dog run, be resistant to insect infestation, rot, fungus, mold and mildew, shall also withstand ultra-violet rays and extreme heat, and allow the free flow of water vertically through the surface and into the drainage system below.

B. The seams of all system components shall provide a permanent, tight, secure, and hazard free surface.

C. The installed synthetic grass and drainage system shall allow for drainage and water flow through the system at a rate of not less than 300 inches per hour.

1.03 SERVICE AND QUALITY ASSURANCE: Synthetic grass vendor shall provide ongoing service quality assurance and warranty consisting of, but not necessarily be limited to, the following:

A. The synthetic grass vendor must provide competent workmen skilled in this type of dog surface installation. The synthetic grass vendor shall provide a qualified installation foreman to coordinate and review the component parts of the synthetic grass system. Foreman shall be introduced to owner or owner's representative prior to start of construction.

B. The synthetic grass vendor and installer must be experienced with no less than six completed commercial dog installations (2500sf or greater) where a knitted synthetic grass surface was installed. Installer must be competent in the installation of this material, including attachment of seams and proper trimming and attaching techniques prior to the start of turf installation.

C. The synthetic grass vendor shall submit its manufacturer's warranty, which warrants the synthetic grass product:

   I. Provide coverage of synthetic grass for a minimum of eight (8) years from the date of substantial completion.

   II. Warrant that the materials installed meet or exceed the product specifications.

   III. Be from a single source (certified by manufacturer) covering workmanship and all materials.

   IV. Assure the availability of exact or substantially the same replacement materials for the synthetic grass system for the full warranty period.

   V. Include general wear and damage caused by UV degradation. The warranty may specifically exclude vandalism and Acts of God beyond the control of the manufacturer or installer.

1.04 SUBMITTALS:

A. Synthetic grass vendor must submit the following to owner or owner's representative with the official bid package:

   I. One (1) copy of the most recent installation reference list for projects of similar scope to this project completed in last five years.

   II. One (1) 12"x12" loose sample of proposed synthetic grass product.

   III. One (1) of the product warranty for proposed synthetic grass product.

   IV. One (1) copy of their maintenance instructions. These instructions will include all necessary instructions for the proper care and maintenance of the newly installed synthetic turf system.

   V. One (1) copy of edge details of proposed installation and terminations of synthetic grass playground system.

   VI. One (1) copy of a signed letter from synthetic grass vendor certifying that the proposed synthetic grass product is manufactured in the USA.

   VII. One (1) copy (if requested) of independent laboratory test reports on system or components.

   VIII. Recommend there is drainage / water permeability test of sub base.

2 PRODUCTS

2.01 SYNTHETIC GRASS SYSTEM:

A. Synthetic grass – ForeverLawn K9Grass Classic

Pile Weight: 72 oz/sy

Face Yarn Type: Primary: Polyethylene; Secondary: Heat set textured nylon monofilament containing antimicrobial agent

Yarn Count: Primary 5,000/4; Secondary 4,200/8

Pile Height (knitted): 3/4 inch

Color: Primary: Summer Green; Secondary: Turf Green

Construction: Knitted

Antimicrobial Protection: AlphaSan (manufactured into yarn)

Tufting Gauge: N/A – knitted product

Backing: Flow-through knitted backing with light acrylic coating

Seaming: Turf Adhesive

Total Product Weight: 87 oz /sy (+/- 2 oz)

Finished Roll Width: 15 feet (4.6 m)

Finished Roll Length: Up to 150 feet (45.72 m)

The synthetic grass shall be delivered in 15-foot-wide rolls. The rolls will be laid out and installed as specified in the site layout and equipment placement drawings.

All seams shall be installed and secured with approved turf adhesive. Seams secured with stitching alone shall not be acceptable.

No Infill material is to be used.

B. Base and Attaching Components: Base is to be prepared using plastic 2" x 4" plastic board and secured using 1" length ¼" crown stainless steel staples. Turf is to be secured around all edges.

3 EXECUTION

3.01 BASE AND DRAINAGE CONSTRUCTION: The synthetic grass base contractor shall strictly adhere to the installation procedures outlined under this section and by the engineer's drawings. Any variance from these requirements must be accepted in writing, by the synthetic grass vendor, and submitted to the owner or owner's representative, verifying that the changes do not adversely affect the performance or warranty.

A. Excavation: Existing ground cover shall be excavated to the depth established on the excavation plan. The subgrade shall also be compacted to a minimum of a 90% compaction rate.

B. Plastic nailer board: The synthetic turf perimeter fastening structure shall be installed before the drainage aggregate.

I. Install a synthetic nailer board around perimeter and all penetrating objects. Nailer board shall be flush to grade (or as specified in site detail drawings) when adjacent to soft surface (i.e. natural grass, mulch). Nailer board shall be ½" below grade when adjacent to hard surface (i.e. concrete or tile).

This shall be the responsibility of the synthetic turf base contractor. See synthetic turf edge attachment detail.

C. Base Drainage Aggregate: Installation of the free draining base aggregate of 3/8" to 5/8" clean compactable angular stone (any mix with fines in excess of 20% must be approved by manufacturer), shall follow procedures provided. If the sub-base does not permit liquids to freely percolate, auxiliary drainage is required. Base material must be installed to a minimum depth of 3 ½ inches. The drainage network and its existing elevations shall not be disrupted through ground pressures from trucks, dozers or by any other means.

I. The stone shall be left firm and compacted while allowing the porosity and drainage capabilities of the aggregate profile.

II. The free draining base course should be designed to meet local soil and weather conditions. It must be installed to a minimum depth of 3 ½" with an overall compaction rate of at least 90%.

3.02 SYNTHETIC GRASS SYSTEM INSTALLATION: After a final inspection of the stone base by the synthetic grass contractor and the Owner's Representative, the synthetic turf installation shall begin. The synthetic grass product shall be delivered in 15-foot-wide rolls.

A. Synthetic grass rolls shall be joined via adhesive bond seaming and reinforced with specialty turf adhesive where necessary.

I. Seams shall be flat, tight and permanent with no separation or fraying.

II. Grass rolls must be installed with pile leaning the same direction.

B. Synthetic Turf Perimeter Attachment:

I. After final layout and seaming of the synthetic grass product, the synthetic turf material shall at a minimum be secured to the top of plastic nailer board firmly anchored to sidewalk, curb, wall or by re-bar making up the perimeter of the synthetic turf area. As an alternate installation method the synthetic turf may be wrapped over the edge of the curb nailer board and secured the full depth of the nailer board.

II. The turf shall be attached to plastic nailer board by stainless steel staples, screws, and/or nails.

III. Soil or surfacing material outside of the defined synthetic turf area shall be backfilled against turf wrapped perimeter edge and have zero transition edge to synthetic turf unless otherwise specified.

IV. Concrete and solid surfaces should be ½" higher than the top of the board.

C. Infill Application:
It is imperative that no in-fill is utilized with synthetic turf used with dogs.

3.03 CLOSEOUT

A. The synthetic grass vendor must verify that a qualified representative has inspected the installation and that the finished surface conforms to the manufacturer's requirements.

B. Extra materials: Owner shall be given option to retain and store excess materials such as excess turf for project, but not installed.

3.04 CLEAN UP

A. Contractor shall provide the labor, supplies and equipment as necessary for final cleaning of surfaces and installed items.

B. During the contract and at intervals as directed by the owner or owner's representative and as synthetic grass system installation is completed, clear the site of all extraneous materials, rubbish, or debris and leave the site in a clean, safe, well draining, neat condition.

C. Surfaces, recesses, enclosures, etc. shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the owner.

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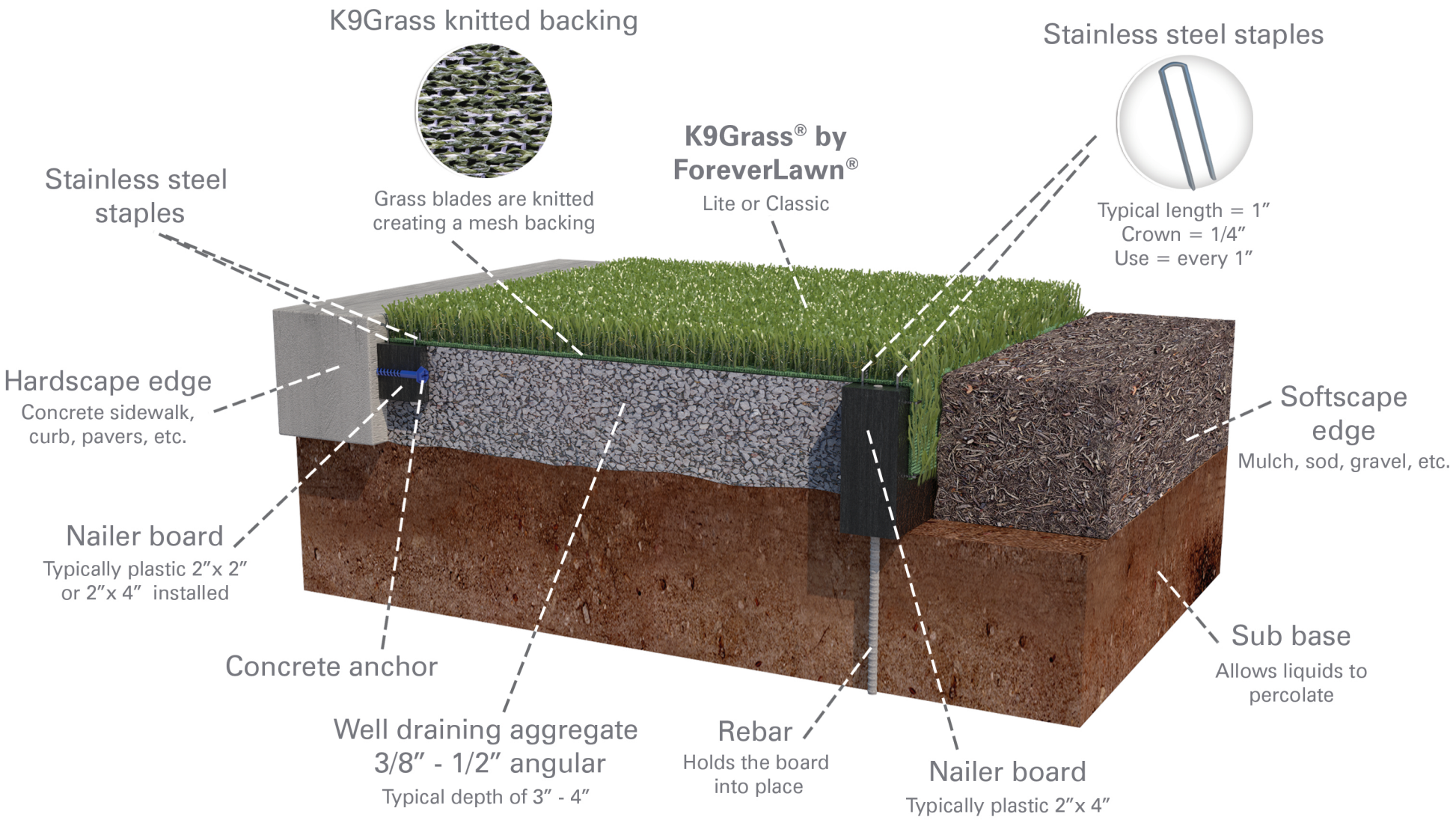
K9Grass® System

Edge Detail - Installed over soil with hard and soft edges

K9Grass® by ForeverLawn®



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SECTION 323113
CHAIN LINK FENCE

P A R T 1 - G E N E R A L

SUMMARY
The work in this section consists of all labor, materials, equipment and incidentals of the fence improvements detailed in the plans and as specified herein.

P A R T 2 - P R O D U C T S

MATERIALS
Chain link fence height above ground will be as designated in the Plans.

Use fence fabric number 9 gauge aluminum coated (0.40 ounces aluminum/square foot) chain link with 2-inch mesh and shall conform to the latest ASTM designation.

Use tension wire at the bottom of the fence fabric in areas without a bottom rail. Tension wire to be 7-gauge aluminum coated (0.40 ounces aluminum/square foot) coil spring wire.

Use hot dipped galvanized line and terminal posts, and conforming to the latest ASTM designation.

Brace terminal posts with the same material used for top rail, midway between top rail and ground extending from terminal post to first adjacent line post and shall be trussed from the line post to base of terminal post with a 3/8-inch truss rod tightener.

Fence Post Classification Table

Type of Post	*Fence Height*	*Outside Diameter*	*Minimum Weight per Lineal Foot Post Material*
Line	6 ft or less	C-14 Roll Formed	1.60 lbs galvanized coated steel
	over 6 ft to 10 ft	C-11 Roll Formed	2.34 lbs galvanized coated steel
	over 10 ft to 12 ft	X-C-11 Roll Formed	2.73 lbs galvanized coated steel
Line	4 ft or Less	2-inch	2.72 lbs galvanized steel
	over 4 ft to 12 ft	2 ½-inch	3.65 lbs galvanized steel
Terminal	4 ft or Less	2 ½-inch	3.65 lbs galvanized steel
	over 4 ft to 12 ft	3-inch	5.79 lbs galvanized steel
	over 12 ft	4-inch	9.10 lbs galvanized steel
Gate	7 ft or less single panel	3-inch	5.79 lbs galvanized steel
	8 ft to 13 ft single panel	4-inch	9.10 lbs galvanized steel
	14 ft to 18 ft single panel	6 ⅝-inch	18.97 lbs galvanized steel
	19 ft and over single panel	8 ⅝-inch	28.55 lbs galvanized steel

Top rail will be 1 ⅝-inch x 1 ¼-inch, 14 gauge roll formed or 1 ⅝-inch outside diameter (2.27 pounds per foot) pipe. Conform hot dipped galvanized to the latest ASTM designation. Bottom rails are subject to same requirements as top rails.

Use gate frames 2-inch outside diameter pipe nominal weight 2.72 pounds per foot, hot dipped galvanized and conform to the latest ASTM designation. Welded corner construction is required. Use double swing gates with a center plunger rod with double latch and semi-automatic outer catches, or as detailed in the Plans.

P A R T 3 - E X E C U T I O N

ERECTION/INSTALLATION/APPLICATION

Set terminal posts in 42-inch deep concrete footings having a minimum diameter of 12 inches. Set gate posts in 24-inch deep concrete footings having a minimum diameter of 3 times the outside diameter of the post size.

Drive set line posts a minimum of 4 feet deep and be space evenly no further apart than 10 feet on center.

Connect fabric to line posts every 14 inches, to top rail every 24 inches, to end, corner and gate posts by using flat tension bars connected to the post every 14 inches with steel bands with bolts and nuts.

The fence will follow the ground.

FIELD QUALITY CONTROL

The Contractor will submit to the Engineer shop drawings and a manufacturer's certification showing that the posts, top rails, and fabric for the project have been tested under the latest ASTM designation and complies with these specifications. All materials may be subject to site testing for compliance to the above specifications with standard tolerances to apply.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

Chain link fence and appurtenances will be paid for in accordance with contract items.

END OF SECTION

SECTION 329119.13
TOPSOIL PLACEMENT AND GRADING

P A R T 1 - G E N E R A L

SUMMARY

Topsoil

This work consists of furnishing humus-bearing soil, adapted to the sustenance of plant life and commonly known as topsoil from locations furnished by the Contractor beyond the limits of the right-of-way or Owner's property and the placing, spreading, and finishing of such topsoil, as shown on the plans, required in the contract, or directed by the Engineer.

Salvaged Topsoil

This work consists of the removal of topsoil from the sites of proposed excavations and embankments in such amounts and to such depths as available and necessary to cover the grading area of the work, and the reclamation, placing, spreading and finishing of such topsoil, all as shown on the plans, required in the contract or directed by the Engineer.

P A R T 2 - P R O D U C T S

MATERIALS

Topsoil consists of the natural loam, sand loam, silt loam, silty clay loam or clay loam humus-bearing soils adapted to the sustenance of plant life, and such topsoil will be neither excessively acid nor excessively alkaline.

Salvaged topsoil will consist of the natural loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing soils available from the overlying portions of the areas contemplated by the plans or contract to be occupied by the project grading area.

P A R T 3 - E X E C U T I O N

CONSTRUCTION METHODS

Undercut or underfill all areas designated to be covered with topsoil to a level that when covered to the required depth with topsoil, the finished work will be in accordance with the required lines, grades, slopes and cross sections. Such work will be considered subsidiary to the items of Topsoil or Salvaged Topsoil and no additional compensation will be made, nor will allowance be made in the final measurement for quantities of excavation.

Clear all areas from which topsoil is procured, if necessary, by means of mowing weeds or other vegetation to a height of approximately 6 inches, and freed from any litter such as brush, rock or foreign material of objectionable size or quantity. Strip off humus-bearing soil to such depth as available or as necessary to produce sufficient volumes to cover the designated areas to the required depths, taking all practicable care to avoid incorporation of any of the underlying sterile soil.

The topsoil stripped from these areas may be temporarily stockpiled on the project site so it can be reclaimed and spread on the areas designated, or it may be contemporaneously placed directly on the designated areas prepared to receive the topsoil.

Stockpile salvaged topsoil in a location that minimizes the possibility of sediment transport offsite. Implement erosion and sediment control best management practices (BMPs) on and around all topsoil stockpiles. At a minimum, install appropriate perimeter control such as silt fence, erosion bale barrier, and/or a topsoil berm.

Place temporary seeding on all surface areas that are to not subject to further surface disturbing activity for at least 7 calendar days. This temporary seeding requirement applies to topsoil stockpiles, embankments, and cut areas of the grade. Do not place temporary seed in storm water basin bottoms, unless called for on erosion or stormwater management plans. Do not place temporary seed on areas that will have subbase, base or pavements placed.

Dispose any appreciable volumes excavated in excess of the amounts required to accomplish the surface restoration requirements with no additional compensation. In the case of salvaged topsoil, deductions from the pertinent excavation items will be made at the applicable contract unit prices for such excavation items in amounts required to supplant the excess topsoil material thus wasted.

Deep till/chisel plowing practices are required for areas compacted by construction equipment to restore soil infiltration properties prior to topsoiling. This work is incidental to topsoil placement operations. After the areas upon which the topsoil is to be placed have been prepared and finished to the required elevations, place the topsoil and spread thereon to a uniform depth as shown on the plans or required in the contract, or if none is so shown, to a depth of 4 inches or such greater depth as designated by the Engineer.

Break down all clods and lumps by means of harrows, discs or other appropriate equipment to provide a uniformly textured surface soil.

Where using either sod or seed, ensure that for the upper two inches, 100 percent of the topsoil passes a one inch sieve and at least 90 percent passes the No. 10 sieve (2mm particle size).

Remove rocks, twigs, clods that will not break down and other foreign material, and dress the entire surface to present a uniform appearance. Rolling will not be required.

Where light sandy soils are covered with heavier clay bearing loam topsoil, mix or blend the two types of soils to a more or less homogeneous mixture by means of discs, harrows or other appropriate equipment to a depth of 6 to 8 inches.

Where there is inadequate space on the project site for the temporary stockpiling of topsoil, make arrangements to secure off-site stockpile site(s). Stockpile locations will be approved by the Engineer. Stockpile depths will not exceed 8 feet. Do not remove topsoil from outside of the right-of-way, project site, or associated construction easement boundaries.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

Topsoil, when included in the scope of the work by a topsoil bid item in the contract, will be measured by the square yard or by the cubic yard as indicated on the bid form. When measured by the square yard, the measured payment quantity is the actual number of square yards of area topsoiled to the depth specified within the construction limits designated on the plans or in the contract or as directed by the Engineer. Topsoil surfaces disturbed and that are reseeded will not be measured for topsoil or salvaged topsoil placement.

When measured by the cubic yard, the topsoil will be measured in the vehicle or the topsoil will be measured in cubic yards of volume in its original position computed by the method of average end areas, if the Engineer so elects. The paid is the actual number of cubic yards furnished and placed in accordance with the requirements of the contract.

Topsoil, measured as provided above, will be paid for at the contract unit price per square yard or per cubic yard for topsoil.

Salvaged topsoil work is considered incidental to the excavation and embankment contract items and no separate measurement or payment will be made for salvaged topsoil, except when a salvaged topsoil bid item is included in the contract.

When the contract includes a salvaged topsoil bid item, salvaged topsoil will be measured by the square yard, and the measured payment quantity under this item is the actual number of square yards of area topsoiled to the depth specified within the limits of construction designated on the plans or in the contract, or as directed by the Engineer. Payment for salvaged topsoil also includes payment for erosion and sediment control items related to salvaged topsoil, unless specific erosion and sediment control items are included in the contract.

When the contract includes a salvaged topsoil bid item, salvaged topsoil, measured as provided above, will be paid for at the contract unit price per square yard for salvaged topsoil, which price is compensation for removing, stockpiling, reclaiming, hauling and placing this material. No deductions will be made from excavation and embankment items for the quantities of salvaged topsoil material which may be obtained from areas of cut section, nor will the volumes of salvaged topsoil removed from sites of proposed embankments be measured for payment or paid for under excavation and embankment items, nor will any allowance, adjustment or measurement for payment under the pertinent excavation and embankment items be made for undercutting of cut sections or underfilling of embankments.

END OF SECTION

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SECTION 329200
TURF AND GRASSES

P A R T 1 - G E N E R A L

SUMMARY

Fertilizing, seeding and mulching consists of furnishing and incorporating fertilizing material in the soil; preparing seed beds and furnishing and sowing the required seed mixture; furnishing and sowing the required temporary seed; and furnishing, placing and/or anchoring a mulch cover on grading areas as designated on the Plans, or designated in the contract, or as directed by the Engineer.

When the contract contains separate items for fertilizing, seeding, temporary seeding, and/or mulching, the work consists of furnishing and incorporating the materials for which items are included in the contract.

When the contract contains an item of Agricultural Limestone Treatment or other soil amendment, the work consists of furnishing and incorporating agricultural limestone in the soil on areas shown on the Plans or designated in the contract, or as directed by the Engineer. If agricultural limestone treatment is identified for use on the plans or in the bid item listing, provide soil testing to identify the required application rates.

SUBMITTALS

Provide the Engineer with empty bags from the fertilizer that was incorporated into the work or an invoice from the supplier/spreader if the fertilizer was truck spread. The information should show the analysis of the contents showing minimum percentages of total nitrogen, available phosphoric acid and soluble potash.

Provide the Engineer with tickets from the empty seed bags which show the seed mixture name, lot number, date of lot production, net weight, percentages of different seed types in the mixture, percentages purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed.

P A R T 2 - P R O D U C T S

MATERIALS

Fertilizer

Fertilizers intended for use in connection with seeding, sodding or other planting will be standard, commercial, packaged or bulk products in granular or liquid forms conforming to the requirements of the Wisconsin Statutes and of the Wisconsin Administrative Code Chapter ATCP 40. Plainly mark each container of packaged fertilizer with the analysis of the contents showing minimum percentages of total nitrogen, available phosphoric acid and soluble potash. When the fertilizer is furnished in bulk, each shipment must be accompanied by an invoice indicating the minimum percentages of total nitrogen, available phosphoric acid and soluble potash in the contents.

When fertilizer having a sum of nitrogen, phosphoric acid and potash greater than 32 percent is used, apply such fertilizer at a rate that will provide an equivalent amount of nitrogen, phosphoric acid and potash.

Fertilizer must meet the following minimum requirements except in critical areas:

Nitrogen, not less than	16%
Phosphoric Acid, not less than	6%
Potash, not less than	6%

Sum of nitrogen, phosphoric acid and potash must not be less than 32 percent. Total nitrogen must be not less than the sum of the phosphoric acid and soluble potash.

Critical areas are defined as areas within 75 feet of wetlands, streams, rivers, and lakes. Slopes, ditches, and swales that drain directly to a wetland, stream, river, or lake are also deemed critical areas. The project engineer may also declare areas within 75 feet of a storm sewer inlet as a critical area if the outlet drains into a water of the state. Fertilize critical areas with phosphorus-free fertilizer. Use 16-0-6, 10-0-10 nitrogen-phosphorus-potash content, or otherwise accepted by the Engineer.

Agricultural Limestone

Use agricultural limestone conforming to the requirements of Chapter 94.66 of the Wisconsin Statutes and of the Wisconsin Administrative Code Chapter ATCP 44. Furnish limestone with a neutralizing index of not less than 40 or more than 109.

Furnish a statement indicating the index zone or grade of the limestone proposed for use.

Seed

All seed will conform to the requirements of the Wisconsin Statutes and the Wisconsin Administrative Code Chapter ATCP 20 regarding noxious weed seed content and labeling. Only use seed that originates from Minnesota, Wisconsin, Iowa, or Illinois.

Do not use seed on the work later than one year after the test date which appears on the label.

Seed Purity and Germination. Test seed when required in accordance with the current edition of Rules for Testing Seed, published by the Association of Official Seed Analysts for sampling and analyzing seed purity, germination and noxious weed seed content.

Seed Storage. Store any seed delivered prior to use in a manner that it will be protected from damage by heat, moisture, rodents or other perils. Contractor will discard and replace any previously tested and accepted seed that has become damaged.

Seed Composition. Use seed mixtures on the right of way or project site that, unless otherwise provided, is composed of seeds of the purity, germination and proportions, by mass, as given in the Table of Seed Mixtures.

Table of Seed Mixtures

Species	*Purity Min. %*	*Germination %*	*Mixture Proportions, Percent*		
			No. 20	*No. 40*	*No. 75*
Kentucky Bluegrass	85	80	6	35	
Red Fescue	97	85		20	
Hard Fescue	97	85	24	20	
Tall Fescue	98	85	40		
Perennial Ryegrass	97	90	30		
Improved Fine Perennial Ryegrass	96	85		25	
Purple Prairie	PLS				4
Black-eyed Susan	PLS				1
Big Bluestem	PLS				10
Sideoats Grama	PLS				20
Canada Wildrye	PLS				35
Annual Ryegrass	PLS				10
Little Bluestem	PLS				10
Indiangrass	PLS				10

Use seed species and varieties listed below. Where no variety is listed, there will be no restriction on the variety furnished.

Species Common Name	Species Botanical Name	Acceptable Varieties
Kentucky Bluegrass	Poa pratensis	
Red Fescue	Festuca rubra	Creeping
Hard Fescue	Festuca ovina var. duriuscula	Improved
Tall Fescue	Festuca arundinacea	Improved turf type
Timothy	Phleum pretense	
Perennial Ryegrass	Lolium perenne	
Perennial Ryegrass	Lolium perenne	Improved Fine
Alsike Clover	Trifolium hybridum	
Red Clover	Trifolium pratense	
Annual Oats	Avena sativa	
Alfalfa	Medicago sativa	

Bromegrass	Bromus inermis	
Orchardgrass	Dactylis glomerata	
Ladino Clover	Trifolium repens var. latum	Ladino
Agricultural Rye	Secale cereale	
Winter Wheat	Triticum aestivum	

Seed Mixture: The selection of the seed mixture or mixtures for use on the project will be approved by the engineer, and unless otherwise provided in the contract, in accordance with the following:

Seed Mixture No. 20 is intended for use on rural projects where light, dry, well-drained, sandy or gravelly soils predominate and used for all high cut and fill slopes (generally exceeding 6 to 8 feet). Also use Seed Mixture No. 20 on all ditches, in slopes, median areas and low fills.

Use Seed Mixture No. 40 in urban or other areas where a lawn type turf is desired.

Use Seed Mixture 75 where native grasses are desired by the owner and proper maintenance will be followed (minimal mowing of 2 to 3 times per year).

Temporary Seed

Use temporary seed that conforms to the following: use oats in spring and summer plantings. Use winter wheat or rye for fall plantings started after September 1.

Place temporary seed in soil stockpiles, soil borrow areas or soil disposal sites expected to be unfinished for more than 7 calendar days.

Use temporary seed as a nurse crop in conjunction with areas of fertilizing, seeding, and mulching unless directed otherwise by the Engineer.

Temporary Seed Composition. Use temporary seed mixtures composed of seeds of the species, purity, germination and proportions, by mass as given below:

Permanent

Species	**Min. % Purity**	**Min. % Germination**
Alfalfa	98	90
Bromegrass	85	85
Orchardgrass	80	85
Timothy	98	90
Red Clover	98	90
Alsike Clover	97	90
Ladino Clover	95	90
Kentucky Bluegrass	85	80

Temporary

Annual Oats	98	90
Agricultural Rye	97	85

Winter Wheat	95	90

Nurse Crop (to be planted with Seed Mix No. 75)

Oats	98	90
Annual Rye	97	90

Use temporary seed mixture composed, by mass, of 60 percent temporary species seeds and 40 percent permanent species seeds.

Use a permanent component composed of seeds of not more than four of the permanent species listed in the foregoing table in any combination.

P A R T 3 - E X E C U T I O N

FERTILIZER

Apply fertilizer uniformly and incorporated in the soil by light discing or harrowing. Use granular fertilizer that is well pulverized and free from lumps when applied.

When fertilizer is incorporated with topsoiled areas, the fertilizer may be applied just prior to and in conjunction with the final discing or harrowing operation of the topsoil, or if the topsoil is manipulated by hand, just prior to the final raking and leveling. Do not apply fertilizer prior to the date seeding occurs.

If fertilizer is to be placed on surfaces on which no topsoil is placed, prepare the soil by discing or harrowing to a depth of at least 6 inches and the fertilizer then incorporated as set forth above.

If fertilizer is to be placed on seeding areas where the seed is to be sown by means of a spray or stream of water under pressure, the required amount of fertilizer may be placed in the tank, mixed together with the water and the seed, and agitated constantly and applied in the seeding operation. Fertilizer applied by this method will not require discing and harrowing after being placed.

When the fertilizing of areas to be sodded is required, spread the fertilizer uniformly over the soil prior to sodding at the rate specified below, after which work the fertilizer into the soil as the soil is loosened and prepared.

When using a native seed mix such as No. 75, fertilizing is not necessary.

Apply fertilizer containing 32 percent sum total of nitrogen, phosphoric acid and potash at 312 lbs/acre or 7.16 lbs/1000 ft^2 of area, unless otherwise specified in the contract.

Do not apply phosphorus fertilizer in environmentally sensitive zones or within 75 feet of a lake, stream, wetland, river, or storm drain inlet that drains directly to a surface water body.

The goal of fertilizer use is to provide the plants with the nutrients needed to initiate and sustain growth. Do not exceed fertilizer application 1 lb N/1000 ft^2 per year (43 lb N/acre).

AGRICULTURAL LIMESTONE

Spread agricultural limestone uniformly over the designated areas at the rate specified in the following table for the index zone of the limestone proposed for use, unless otherwise specified in the contract.

Application Rate per 1000 Square Feet

Index Zones	40-49	50-59	60-69	70-79	80-89	90-99	100-109
Pounds	140	120	100	90	80	70	60

For convenience in checking the required rate of application, the materials used may be measured on a volumetric basis, providing the conversion from mass to volume is determined from representative samples of the materials used.

Incorporate agricultural limestone in the soils in the designated areas in conjunction with the required fertilizers, and the pertinent construction requirements applicable to fertilizers.

SEEDING

Perform seeding in conjunction with either mulching or the installation of an erosion mat as specified and approved by the Engineer.

Complete grading work, topsoil placement and fertilizing items, when part of the work under the contract, before permanent seeding. If equipment designed for combining the fertilizing, seeding, and mulch placement is used, the fertilizer and seed mixture may be placed in one operation.

Work the area to be seeded with discs, harrows or other appropriate equipment until a reasonable even and loose seed bed is obtained immediately in advance of the seeding.

Select the method of sowing from either Method A or Method B described below.

Sowing Method A

Upon the prepared seed bed, sow the selected seed by means of equipment intended for the purpose of uniformly scattering the seed over the areas to be seeded. Scattering seed by hand only with satisfactory hand seeders and only at such times when the air is sufficiently quiet to prevent seeds from blowing away.

Sowing Method B

Upon the prepared seed bed, sow the seed by means of a stream or spray of water under pressure operated from an approved type of machine designed for that purpose. Place the selected seed mixture and water into tanks provided within the machine in sufficient quantities that when the contents of the tank are sprayed on a given areas the seed will be uniformly spread at the required rate of application. During the process constantly agitate the contents of the tank to provide uniform distribution of the seed. Apply the contents of the tanks within one hour after the seed is added to the tank. Seed which is allowed to remain mixed with the water for longer

than one hour will be rejected. Dragging or rolling will not be required of areas seeded with the water spray method.

Minimize overspray onto non-topsoil surfaces. Clean overspray onto personal property, power poles, hydrants, utility pedestals, and other areas indicated by the Engineer.

Use the minimum sowing rate for seeds in pounds per 1,000 square feet of area as follows:

Seed Mixture No. 20 at 4.5 lbs. (195 lbs/acre) for rural (non-lawn) type applications
Seed Mixture No. 40 at 3 lbs. (130 lbs/acre) for lawn type applications
Seed Mixture No. 75 at 1 lbs. (44 lbs/acre) for native grass applications
Temporary Seeding at 3 lbs Nurse Crop (130 lbs/acre)

Species	**Spring Planting**	**Fall Planting**
Oats	64 lbs./acre 1.5 lbs./1000 sq. ft.	128 lbs./acre 3.0 lbs./1000 sq. ft.
Annual Rye	5 lbs./acre 0.2 lbs./1000 sq. ft.	15 lbs./acre 0.6 lbs./1000 sq. ft.

Protection/Maintenance

Maintain fertilized, seeded and/or mulched areas until a uniform grass stand has developed of 70 percent vegetative cover. If sufficient rains are not occurring to sustain grass growth provide supplemental watering of seeded areas. Reseed or other touching up areas of minor erosion that may occur between seeding operation and acceptance of a uniform grass stand.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

Fertilizing, seeding, and agricultural limestone will be measured by the square yard or unit of weight. Some restoration services are listed as incidental to another work effort, in those case no measurement will be made for that work completed.

Fertilizing, seeding and agriculture limestone measured as provided above, will be paid for at the contract unit price, which price is full compensation for storing, furnishing, hauling, placing and incorporating the required materials in and on the soil; and for all labor, equipment, tools, and incidentals necessary to complete and maintain the work.

When the contract includes separate pay items these work items will be measured and paid for as described below.

Fertilizing – by the hundred weight (Cwt.)
Seeding, Mixture No. 20 – by the pound (lb)

Seeding, Mixture No. 40 – by the pound (lb)
Seeding, Mixture No. 70 – by the pound (lb)
Seeding, Temporary – by the pound (lb)

Agricultural limestone treatment will be measured by the ton (2000 lbs.), based on an application rate of 100 pounds per 1000 square feet and an index zone of 60-69. Measure quantity for payment as the number of tons of material determined by multiplying the actual number of tons of material incorporated by 100 and dividing by the application rate required for the index zone of the material used.

Agricultural limestone treatment, measured as provided above, will be paid for at the contract unit price per ton for said item, which price is full compensation for furnishing, hauling, placing and incorporating the required materials in the soil; and for all labor, equipment, tools and incidentals necessary to complete the work.

END OF SECTION

SECTION 330500
COMMON WORK INSTALLATION & TESTING PIPING SYSTEMS

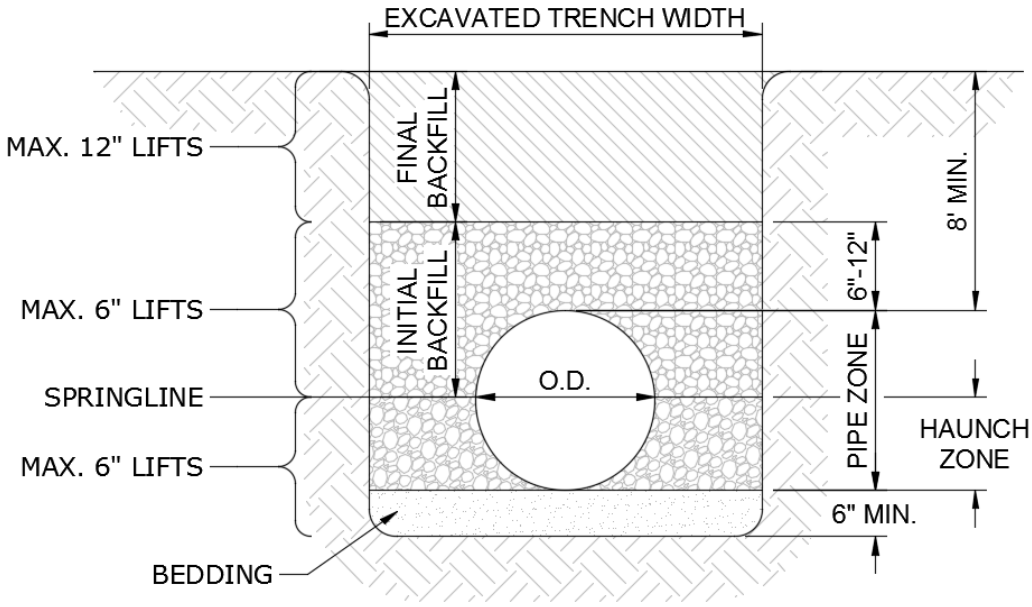
P A R T 1 - G E N E R A L

SUMMARY
This work includes all materials, labor, equipment, and incidentals necessary to install piping systems.

The work in this section consists of testing of watermain, sanitary sewer, and storm sewer piping and appurtenances. Use the Utility Test Report form in this section to document testing of piping systems.

SYSTEM DESCRIPTION
Figure 1 shows a trench cross-section, which identifies the meaning of terminology used in this specification.

Figure 1



DEFINITIONS
Plastic pipe includes PVC (polyvinyl chloride) and corrugated wall HDPE (high-density polyethylene).

QUALITY ASSURANCE
Conduct piping systems tests only when the Engineer or authorized representative is present.

With the approval of the Engineer, the Contractor may, for some piping systems, select the type of test to conduct.

DELIVERY, STORAGE, AND HANDLING

At the time of delivery, inspect all pipe and accessories for loss or damage in transit. Do not accept shipment of material unless proper exceptions as to loss and/or damage are made on the receipt provided by the carrier. Safely store all material furnished, until it has been properly installed.

Unload pipe and accessories at the point of delivery and distribute them to the site. Pipe and accessories must be handled with care to avoid damage. Identify staging areas for delivery of materials prior to the construction phase, preferably at the preconstruction conference. Provide traffic control approved by jurisdictional authority for roadways for all delivery activities. Confirm jurisdictional authority with Engineer for routes designated as lettered county or numeric state or federal highways.

P A R T 2 - P R O D U C T S

MATERIALS

Bedding and Haunching

All bedding, haunching, initial backfill, and final backfill will be free from debris, rocks, boulders, snow, and ice. Excavated soil from the trench area can be used for bedding and haunching material if approved by the Engineer. Class I, II and III soils, as indicated in Table 1, can be used for bedding and haunching for concrete and ductile iron pipe. Class I or II soils can be used for bedding and haunching for plastic pipe.

Initial Backfill

Initial backfill must not contain rocks, which may dislodge or damage the pipe. Excavated soils from the trench area may also be used for initial trench backfill if approved by the Engineer. Class I, II and III soils are suitable for initial backfill for all piping systems, except plastic pipe. Initial backfill for plastic pipe must be Class I or II.

Final Backfill

Excavated soils from the trench area are suitable for final backfill below the roadway subbase to 12 inches above the top of the pipe system, provided compaction specifications can be met.

Tracer Wire Access Box

Furnish and install tracer wire access boxes as indicated in the Plans and Special Provisions. Label tracer wire access boxes with “Tracer Wire” as manufactured by Valvco, Inc. or equivalent.

TABLE 1
DESCRIPTION OF EMBEDMENT MATERIAL CLASSIFICATIONS

SOIL CLASS	SOIL TYPE	DESCRIPTION OF MATERIAL CLASSIFICATION
Class I Soils*	--	Manufactured angular, granular material, ¼ to 1½ inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells.
Class II Soils**	GW	Well graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
	SW	Well graded sands and gravelly sands, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on NO. 200 sieve. Clean.
	SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
Class III Soils***	GM	Silty gravels, gravel-sand silt mixtures. 50% or more retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
	SM	Silty sands, sand-silt mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
	SC	Clayey sands, sand-clay mixtures. More than 50% passes No. 4 sieve. More than 50% retained on No. 200 sieve.
Class IV Soils	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	MH	Inorganic silts, micaceous or diatomaccous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
Class V Soils	OL	Organic silts and organic silty clays of low plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
	OH	Organic clays of medium to high plasticity. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
	PT	Peat, muck and other highly organic soils.

* Soils defined as Class I materials are not defined in ASTM D2487.
** In accordance with ASTM D2487, less than 5% pass No. 200 sieve.
*** In accordance with ASTM D2487, more than 12% pass No. 200 sieve. Soils with 5% to 12% pass No. 200 sieve fall in borderline classification, e.g., GP-GC.

P A R T 3 - E X E C U T I O N

PREPARATION

Notify all utilities and Diggers Hotline at least 3 working days before beginning excavation.

ERECTION/INSTALLATION/APPLICATION

Inspect pipe and accessories for defects prior to lowering into trench. All material found during the progress of the work to have cracks, flaws, or other defects, will be rejected by the Engineer. Replace any defective, damaged or unsound pipe. Promptly remove defective material from the site of the work.

Excavate to lines and grades shown on the plans or as directed by the Engineer. Use a backhoe bucket without teeth so that the trench can be cut without disturbing the trench floor where suitable granular subgrade is present and avoid the necessity of compacting foundation soils to the density required for bedding. The trench width at the ground surface will vary dependent upon the trench depth, soil type and trench support system used. The minimum trench width at the bottom of the excavation will meet the pipe manufactures minimum recommendations for installation and may exceed the minimums listed in Table 2 herein. In all cases the minimum horizontal clear width of the supported or unsupported trench at the trench bottom, where the pipe will be laid, will be dependent upon the pipe material and size, and conform to Table 2.

TABLE 2
MINIMUM TRENCH WIDTH

Nominal Pipe Size (inch)	Minimum Trench Width (inch)
4	20
6	22
8	24
10	30
12	36
14	38
16	40
18	42
20	44
24	48
30	54
36	60
42	66
48	72
54	78

Lay pipe on a minimum 6-inch layer of bedding soils mechanically compacted to a minimum 95 percent standard proctor density. Import granular material, if necessary. Use of mechanical compaction equipment is required.

Remove all foreign matter or dirt from the interior of the pipe and accessories before lowering into position in the trench. Do not install pipe in water. When pipe laying is not in progress, close open end of pipes by approved means to prevent entrance of trench water or debris into the lines. Deposit adequate backfill on the pipe to prevent floating. Remove and re-install any pipe that has floated.

During and after laying, keep pipe clean by means approved by the Engineer. Wipe clean the ends of the pipe to be jointed and all contact surfaces immediately before painting and/or applying required lubricant. Assemble pipes in accordance with manufacturer's recommendations.

Bedding and Haunching

After laying the pipe on compacted bedding material, place haunching material and compact to a minimum of 95 percent standard proctor density under and around the pipe in layers not exceeding six inches up to the spring line of the pipe.

Initial Backfill

For pipe other than plastic pipe, excavated trench material meeting soil Class I, II, or III may be used as initial backfill from the spring line of the pipe to 12 inches above the crown of the pipe. For plastic pipe, initial backfill must be Class I or II. Mechanically compact initial backfill to a minimum 95 percent standard proctor density. Care should be taken when compacting over the top of the pipe.

Final Backfill

Excavated soil from the trench area may be used as final backfill. Place and mechanically compact final backfill in continuous layers not to exceed 12 inches loose depth. Minimum density will be 95 percent standard proctor density from 12 inches above the crown of the pipe to a point four feet below the surface. From four feet below the surface to the surface or top of subgrade on paved areas, the minimum density will be 100 percent standard proctor density. See subbase, base aggregate, and paving specifications for compaction requirements for pavement materials.

Dispose excess materials generated by pipe installation. Disposal (or on-site spreading, if acceptable to the Engineer) of excess materials is incidental to pipe installation.

Tracer Wire System

Install tracer wire on all non-conductive watermains, water services, and sanitary sewer services, and storm sewers including private mains and services. Tracer wires are not required on copper water services, or sanitary sewer mains and storm sewer segments, which possess manholes or aprons at each end of pipe segments as a means of locating the underground pipe.

Use a minimum of 12-gauge solid copper wire with plastic insulation suitable for direct bury applications. Use blue colored insulation for water piping, green for sanitary, and brown for storm piping. Place tracer wire along the top of the pipe and anchored to the pipe with adhesive tape at 5-foot intervals. Do not wrap tracer wire around pipe in lieu of tape connections.

Unless unavoidable, use continuous tracer wire without splices for the full length of the underground segment. Where splices are necessary, accomplish splices with a split bolt connector or a compression-type connector.

Accomplish access to plastic watermain tracer wires at curb stops and hydrants. Connect tracer wire copper water service piping near corporation stop with a PPC bronze pipe clamp 8100 DB (or equal) suitable for direct burial, and also connected to hydrant barrel with an exothermic weld.

Extend tracer wire for sanitary sewer services to tracer wire access box located at property line. At this point, private property owner has responsibility to extend tracer wire to the structure and provide access.

Tracer wire system must pass a continuity test.

Tracer wire system is considered incidental to the payment made for pipe installed.

FIELD TRENCH AND BACKFILL QUALITY CONTROL

The Engineer may require up to two compaction tests per backfill layer per 500 lineal feet of pipe installed. Tests will be paid for by the Owner. The Engineer may require two additional tests for each test that shows bedding, haunching, initial backfill or final backfill not meeting the compaction requirements. Contractor will pay for these tests. The Engineer or a testing laboratory approved by the Engineer will perform all compaction testing.

FIELD PIPE QUALITY CONTROL

Required tests as follows:

Pipe Type	Required Test
Gravity sanitary sewer	Infiltration, exfiltration, or air pressure[(1)]
PVC gravity sewer	Deflection
Corrugated HDPE storm sewer	Deflection
Pressure sewer and forcemain	Hydrostatic and leakage
Watermain	Hydrostatic and leakage
Ductile iron watermain	Electrical conductivity
All non-conductive mains and laterals[(2)]	Tracer wire continuity

[(1)]Test to be selected is dependent upon site conditions, see test descriptions. One test required.

[(2)] Includes watermain, sanitary sewer, forcemain, and storm sewer.

<u>Infiltration/Exfiltration</u>

Maximum allowable infiltration or exfiltration, expressed in gallons per foot per hour, for various pipe sizes, are:

Diameter of Sewer (inches)	Allowable Infiltration/Exfiltration (gallons per foot per hour)
4"	0.0063
6"	0.0095
8"	0.0126
10"	0.0158
12"	0.0190
15"	0.0237
18"	0.0284

Infiltration testing is an acceptable test method when the groundwater level is at least two feet above the highest point of the pipe being tested. The allowable infiltration for any portion of sewer system should be measured by a weir or current meter placed in the appropriate manhole and should not exceed the established limits listed above.

Exfiltration testing is an acceptable test method in dry areas or when the groundwater is no more than two feet above the highest point of the pipe being tested. During exfiltration testing, the maximum internal pipe pressure at the lowest end should not exceed 25 feet of water or 10.8 psi; and the water level inside the highest manhole should be two feet higher than the top of the pipe or two feet higher than the groundwater level, whichever is greater. The allowable exfiltration, as measured by the drop of the water in the manhole, must not exceed the limits established in the table above.

Air Pressure

Air pressure testing will conform to ASTM C828.

Do not exceed 0.5 psi pressure drop between the two successive manholes. The test pressure must be 4.0 psi, plus the equivalent groundwater pressure, if any, above the top of the sewer pipe.

The duration of the test for each pipe size will be as follows:

Diameter of Pipe (inches)	Time (minutes)
4	2½
6	4
8	5
10	6½
12	7½
15	9½

Deflection

All PVC and corrugated HDPE sewer pipe will be subjected to a deflection test. Contractor provides the mandrel and all necessary equipment for this test. Unless otherwise approved by the Engineer, perform deflection tests not less than 30 days after the pipe has been installed and backfill compacted, but before pavement is installed. The test will consist of pulling a mandrel through the pipe. Pull the mandrel freely through the entire length of the pipe and without

mechanical pulling devices. The mandrel will have an outside diameter 5% smaller than the inside diameter of the pipe. The mandrel design must prevent it from tipping from side to side. The mandrel will have nine various sized fins or legs of appropriate dimensions for various diameter pipes, as applicable. Each fin or leg will have a permanent marking that states the designated pipe size and percent deflection allowable. Any section of pipe failing to pass the deflection test will be repaired or replaced and retested at the Contractor's expense.

Hydrostatic

After the pipe has been laid, all newly laid pipe or any valved section thereof will be subjected to a minimum test pressure of 150 psi, measured at the lowest point of elevation. Perform the test in accordance with AWWA C600, Section 4.

Test pressures will:

a. Not be less than 1.25 times the working pressure at the highest point along the test section.
b. Not exceed pipe or thrust restraint design pressures.
c. Be of at least 2-hour duration.
d. Not vary more than ±5 psi.
e. Not exceed twice the rated pressures of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants.
f. Not exceed the rated pressure of the valves if resilient-seated butterfly valves are used.

Fill each valved section of pipe with water slowly to the specified test pressure. The test pressure is based on the elevation of the lowest point of the section being tested and corrected for the elevation of the test gage. Apply pressure by means of a pump connected to the pipe in a manner satisfactory to the Engineer.

Before applying the specified test pressure, expel air completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, close the corporation cocks and the test pressure applied. At the conclusion of the pressure test, the corporation cocks must be removed and plugged or left in place at the discretion of the Owner.

Carefully examine all exposed pipe, fittings, valves, hydrants, and joints during the test. Repair or replace any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test and with sound material. Repeat the test until it is satisfactory to the Engineer.

Leakage Test

Perform a leakage test after satisfactory completion of the pressure test.

a. Leakage is defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure of 150 psi test pressure for two hours after the air in the pipeline has been expelled and the pipe has been filled with water.
b. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{133{,}200}$$

in which L is the allowable leakage in gallons per hour, S is the length of pipe tested in feet, D is nominal diameter of the pipe in inches, and P is the average test pressure during the leakage test in pounds per square inch gage.

c. Allowable leakage at various pressures is shown in the following table.

d. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/inch of nominal valve size will be allowed.

e. When hydrants are in the test section, the test will be made against the closed hydrant.

f. Acceptance will be determined on the basis of allowable leakage. If any section tested has leakage greater than that specified, the Contractor, at his own expense, must locate and repair the defective material until the leakage is within the specified allowance.

g. Repair all visible leaks regardless of the amount of leakage.

Allowable Leakage per 1000 ft of Pipeline - gph

Avg. Test Press. psi	Nominal Pipe Diameter - in.																
	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
450	0.32	0.48	0.6½	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400	0.30	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350	0.28	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300	0.26	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275	0.25	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250	0.24	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225	0.23	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
200	0.21	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
175	0.20	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150	0.19	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125	0.17	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100	0.15	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

*** For pipe with 15-ft nominal lengths. To obtain the recommended allowable leakage for pipe with 20-ft nominal lengths, multiply the leakage calculated from the table by 0.9. If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.**

from AWWA Standards, C600, Section 4, Hydrostatic Testing, page 19

Electrical Conductivity

Electrical conductivity is determined by using a low voltage, low amperage DC conductive tracing device similar to Fisher TW6 locator. Include the new watermain system in the electrical loop and apply maximum 500 amp current long enough to register a completed circuit on an amperage meter.

Failure to register a completed circuit will indicate failure of electrical conductivity. Make repairs to the watermain system and the repeat test.

Do not attempt to pass the conductivity test by increasing voltage and causing arcing between water components and damaging the water system. Do not connect electrodes to hydrants to perform the conductivity test.

Tracer Wire Continuity

All segments of tracer wire installed along non-conductive mains and services must pass a continuity test at the conclusion of backfilling, prior to surface restoration. Continuity is defined as less than one-OHM resistance on an OHM meter.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

Installation of piping systems is incidental to payment for the piping systems.

Furnish equipment and supplies as necessary to perform the required testing. Testing of piping systems is incidental to payment made for the piping systems.

COOPER ENGINEERING COMPANY, INC.

Utility Test Report

Project: _____ Date: _____
City Project No.: _____ CEC Project No.: _____
Contractor: Observer/Engineer:

Air Pressure Test (Sanitary Sewer)	Loc./Street: _____ MH# _____ to MH# _____	Loc./Street: _____ MH# _____ to MH# _____	Loc./Street: _____ MH# _____ to MH# _____
Groundwater Pressure, if any	_____ psi	_____ psi	_____ psi
Starting Test Pressure	_____ psi	_____ psi	_____ psi
Test Duration	_____ min	_____ min	_____ min
Pressure Drop	_____ psi	_____ psi	_____ psi
Pass/Fail			
Mandrel/Deflection Test (PVC Sanitary/P.E. Storm)	Loc./Street: _____ MH# _____ to MH# _____	Loc./Street: _____ MH# _____ to MH# _____	Loc./Street: _____ MH# _____ to MH# _____
Inside Diameter of San. Sewer	_____ in.	_____ in.	_____ in.
Diameter of Mandrel	_____ in.	_____ in.	_____ in.
	☐ Mandrel passed through this section of sewer with no problems. ☐ Problems were encountered pulling mandrel, approximately _____ ft. downstream of MH #_____.	☐ Mandrel passed through this section of sewer with no problems. ☐ Problems were encountered pulling mandrel, approximately _____ ft. downstream of MH #_____.	☐ Mandrel passed through this section of sewer with no problems. ☐ Problems were encountered pulling mandrel, approximately _____ ft. downstream of MH #_____.

Hydrostatic Pressure Test (Watermain) Location/Street: _____ From Station: _____ To Station: _____

Test Duration	_____ hr/min		
Working Pressure (from design engineer)	_____ psi		
Starting Test Pressure	_____ psi		
Pressure Drop	_____ psi	☐ Pass	☐ Fail

Leakage Test (Watermain) Location/Street: _____ From Station: _____ To Station: _____

Test Duration	_____ hr/min		
Test Pressure	_____ psi		
Allowable Leakage	_____ gph		
Actual Leakage	_____ gph	☐ Pass	☐ Fail

Conductivity Test (Ductile Iron Watermain) Location/Street: _____ From Station: _____ To Station: _____

☐ Completed Circuit Registered ☐ Completed Circuit Not Registered

Continuity Test – Tracer Wire ☐ Pass ☐ Fail

*As well as the tests above, final acceptance of installed sanitary sewer may be contingent on televising (by municipality); final acceptance of installed watermain contingent on bacteria testing (flushing/sampling/lab tests by municipality).

Remarks:

_____
_____
_____
_____

_____ _____ _____ _____
Engineer Representative Date Contractor Representative Date

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SECTION 330513
MANHOLES AND STRUCTURES

P A R T 1 - G E N E R A L

SUMMARY
The work in this section consists of constructing manholes, special manholes, inlets, and castings as shown on the Plans.

SUBMITTALS
Shop Drawings

Submit four (4) copies of Shop Drawings to Engineer for review, in accordance with Section 013323. An alternative to submitting the paper copies is submitting the shop drawings in a portable document format (pdf) formatted to accept edits and mark ups. Include a cover letter or note in the submittal to the Engineer indicating that the contractor has reviewed the shop drawings for compliance with the project plans and specifications.

P A R T 2 - P R O D U C T S

MATERIALS
Precast Reinforced Concrete Manholes

Meet the requirements of ASTM C-478 for precast reinforced concrete manholes, risers, and tops. Use precast flat slabs or eccentric cone type for precast top sections. 48-inch diameter cone and barrel sections will be a minimum 5 inches thick. Concrete will have a minimum compressive strength of 4000 psi.

Crown sanitary sewer manholes to a 27-inch opening as shown on the Plans. Start the cone a minimum of 15 inches below finished grade.

Construct storm sewer manholes with a precast top slab with an opening required for casting, as shown on the Plans.

Use tongue and groove joints with rubber-type gaskets. The rubber-type gaskets will meet the requirements of ASTM C-443.

Use precast concrete manhole bases, field poured bases, or precast integral base-barrel sections as detailed on the plans. If the Plans do not specify type of base required, it will be at Contractor's option.

Outside drops are required for all sanitary sewer pipe-to-manhole connections where the entering pipe invert is more than 24 inches above the spring line of the outgoing pipe. Construct outside drops in accordance with the details in the Plans.

Manhole steps will be installed by the manhole manufacturer and be steel-reinforced plastic. Use manhole steps made with an approved plastic such as copolymer polypropylene that meet

the requirements of ASTM 2146 Type II Grade 49108. Also use steel-reinforced plastic steps with a deformed ½-inch diameter reinforcing bar that conforms to the requirements of ASTM A-615 Grade 60.

For manholes installed in groundwater or for use with sanitary sewer, use a watertight elastomer connection boot (PSX type of boot by Press-Seal, Inc or equal) cast into the precast manhole base. For connections to existing manholes, drill a core hole and install a modular elastomer sealing system installed to create a permanent hydrostatic seal (Link-Seal by GPT Industries or equal) between the pipe and the manhole wall.

Inlets

Use inlets 24 inches by 36 inches rectangular or 30-inch diameter round with precast base and precut holes for pipes as shown on the Plans.

Castings

Use all manhole and inlet castings that conform to the requirements of ASTM A-48 and that are be free of cracks, holes, swells, and cold shuts. Use new and furnished castings as indicated on the Plans.

Block Built Structures

Block built structures will only be allowed if stated in the special provisions or by the discretion of the engineer during the shop drawing review process.

Unless the plans or contract provides otherwise, place all block structures on a precast reinforced concrete slab subject to shop drawing review procedures. Construct the slab in a way such that a minimum of 6 inches extends beyond the outside of all manhole or inlet walls. Use flat top slabs that are also precast reinforced concrete and subject to shop drawing review procedures. The top slab must be equal in dimension and shape to the manhole or inlet, such that it does not extend beyond the outside of any wall.

Bedding

Where water and/or soft, spongy subsoil is encountered, set all manhole bases on a minimum of eight (8) inches of ¾-inch rock bedding. Rock bedding is incidental to the manhole cost.

In other areas, use the same bedding for manholes as the bedding for the pipe being installed.

Mortar

Mortar to be used for pipe/manhole connections, block built structures, and concrete adjusting rings will be a Type M masonry mortar of the following proportions: twelve parts masonry sand, 3 parts Portland cement, and one part hydrated lime.

Concrete

For concrete used for manhole and inlet inverts, use minimum requirements for Grade A concrete as defined in Section 501 of the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction.

Geotextile Fabric

Geotextile fabric, Type DF, consists of either woven or non-woven synthetic filter fabric. Non-woven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof. Minimum requirements for all fabric are:

Test Requirement	Test Method	Value*
Minimum grab tensile strength	ASTM D 4632	110 lb
Minimum puncture strength	ASTM D 4833	40 lb
Minimum apparent breaking elongation	ASTM D 4632	30%
Maximum apparent opening size	ASTM D 4751	300 μm
Minimum permittivity	ASTM D 4491	0.70 sec^{-1}

PART 3 - EXECUTION

EXAMINATION

Verification of Conditions

At the time of delivery, inspect all manhole sections, bases, rings, and castings for loss or damage in transit. Do not accept materials unless proper exceptions as to loss and/or damage are made on the receipt obtained from the carrier.

Reject all material found during the progress of the work to have cracks, flaws, or other defects and promptly remove and replace defective material.

Safely store all material furnished until it has been properly installed.

Unload manhole sections and accessories, unless contrary instructions are received, at the point of delivery, hauled to, and distributed at the site of the project. Handle materials with care to avoid damage.

Identify staging areas for delivery of materials prior to the construction phase, preferable at the preconstruction conference. Provided traffic control approved by jurisdictional authority for roadways for all delivery activities. Confirm jurisdictional authority with Engineer for routes designated as lettered county or numeric state or federal highways.

ERECTION/INSTALLATION/APPLICATION

Manhole Bases

Set integral precast base and barrel sections plumb and at an elevation which allows a minimum of 2½ inches between the top of the base and the bottom of the outgoing pipe to allow for the field poured concrete manhole floor and invert. This 2½ inch gap is not required if manhole invert and flow line are precast by supplier.

For cast-in place concrete bases, set the precast bottom barrel section on concrete brick or block so that the bottom of the section is below the invert of the outlet pipe. The bottom barrel section will be plumb and a minimum 12 inches tall, with poured concrete base. Extend the cast-in-place base a minimum of 6 inches beyond the outside face of the barrel wall.

Pipe/Manhole Connection

Use masonry mortar in conjunction with manhole brick to fill the void between the pipe and manhole wall. Fill all voids to create a watertight seal. Apply a plaster coat of mortar to provide a smooth, even finish between the pipe and manhole wall.

Backfill the annular space between the manhole excavation and the outside of the manhole wall with bedding material up to the spring line of the connected pipes. Use concrete brick or block necessary between the manhole and first pipe joint to provide support for the pipelines.

Invert

Do not cast-in-place the invert until the manhole is completely built and backfilled. Form the invert flow line to be the same diameter as the largest connecting pipe.

For precast bases with precast flow lines, form the flow line to match the largest connecting pipe diameter. In cast-in-place and precast bases, construct the concrete floor in the manhole bottom to the spring line of the pipe and sloped upward to the manhole wall.

Cast inverts and finish to allow room for installation of the mandrel/dummy necessary to test deflection of flexible pipelines.

Riser and Cone Sections

Install riser and cone manhole sections plumb with steps aligned and located so as to allow direct access to the concrete landing created by the poured invert. Plug all lifting holes with non-shrink grout.

Casting and Rings

Center castings for manholes and inlets and brought to grade by use of adjusting rings (6-inch minimum/12-inch maximum). Use reinforced concrete adjusting rings, unless otherwise specified. Set concrete adjusting rings and grout in a (Type M) mortar bed. Cast-in-place a concrete collar around the exterior of the adjusting rings on all inlets. Grout and trowel finish the inner face of all concrete adjusting rings (with the same mortar).

Recycled HDPE adjusting rings may be used for manholes and/or inlets if provided for in the Special Provisions. Provide HDPE rings in varied thicknesses and tapered thicknesses as required, manufactured from recycled polyethylene plastic in accordance with ASTM D 1248, and install per manufacturer's recommendations. Place a bead of manufacturer-recommended butyl sealant between the rings, cone, and casting. If the cone or top slab is chipped or broken prior to placement of sealant and bottom ring, create a flat sealable surface using Type M mortar. Use a double bead of sealant between the casting and the top ring.

Wrap HDPE rings in geotextile fabric, Type DF. Extend the fabric a minimum of 6 inches onto the concrete structure for inlets, and 6 inches out from the lowest ring on manholes with a flat top slab. Extend the fabric onto the flange of the casting. Overlap any joints in the fabric a minimum of 12 inches. On inlets, the cast-in-place a concrete collar integral with the curb shall cover the adjusting rings and be at least 6 inches thick as measured outward perpendicular to the exterior walls of the inlet.

Casting Adjustment

Set castings in roadways to 1/4-inch (0.02 foot) to 3/8-inch (0.03125 foot) below finished asphalt surface. Set castings to match the cross slope and grade of the roadway surface. Use tapered adjusting rings if necessary to achieve the slope. Owner/Engineer may reject any casting adjustments outside this tolerance.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

The quantity of manholes, structures and castings installed will be paid for at the Contract unit prices. When the quantity of manholes and structures installed will be paid for per vertical foot, they will be measured from the invert of the outgoing pipe to the rim or grate of the casting. The quantity of castings, per type, installed will be paid for at the contract unit price per each if listed on the bid form. Adjusting rings and sealant/mortar will not be paid for separately, but are considered incidental to the manhole or inlet items. Contract unit prices will be payment in full for furnishing all materials; forming foundation; sheeting and shoring; dewatering; backfilling; bedding material; removing sheeting and shoring; cleaning and restoring the site of the work; and for all labor, tools, equipment and incidentals necessary to complete the work in accordance with the Contract, unless specific Contract items are otherwise provided in the Contract.

END OF SECTION

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SECTION 334000
STORMWATER UTILITIES

P A R T 1 - G E N E R A L

SUMMARY

The work in this section consists of constructing storm sewer, culvert pipes, and endwalls.

P A R T 2 - P R O D U C T S

MATERIALS

Use new undamaged material complying with and manufactured in conformity with the latest standards and/or specifications issued by AWWA, ASTM, ASA, AASHTO and FHWA.

Reinforced Concrete Pipe (Circular)

For circular reinforced concrete pipe, use bell and spigot pipe made in accordance with ASTM C-76. Install pipe by open cut methods at minimum Class III, concrete strength equal to 4000 psi (or as otherwise indicated in the Plans). Pipe must be true and free from spalls or other defects and smooth enough that rubber jointing gaskets may be properly applied thereto. The inside slope of the bell or groove and the outside slope of the spigot or tongue where the gasket is positioned must be parallel; and the slope in the range of four to ten (4 to 10) degrees inclusive from the centerline axis of the barrel of the pipe. Pipe end planes are perpendicular to the longitudinal axis and not vary more than specified in ASTM C-76.

Clearly mark on each section of pipe the pipe class, date pipe was made, name of manufacturer, and, if applicable, the minor axis of elliptical reinforcing.

Use joints made with flexible compression-type rubber gaskets manufactured in accordance with ASTM C-361.

Corrugated High Density Polyethylene (HDPE) Pipe

Corrugated HDPE pipe and fittings conforms to the requirements of the specifications for corrugated polyethylene pipe, 12- to 36-inch diameter (AASHTO M294, Type S). Corrugated HDPE pipe is N-12 as manufactured by Advanced Drainage Systems, or approved equivalent.

Minimum parallel plate pipe stiffness values are as follows:

Diameter	Pipe Stiffness*
12”	50 psi
15”	42 psi
18”	40 psi
24”	34 psi
36”	22 psi

* Per ASTM D-2412

The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings may be either molded or fabricated by the manufacturer. Fittings supplied by manufacturers other than the supplier of the pipe are not permitted without the approval of the Engineer.

Use joints that are soil tight push on type (bell and spigot) joints for storm sewer installations.

Install in accordance with ASTM D-2321 or as specified by the Engineer.

Furnish a manufacturer's certification that the product was manufactured, tested, and supplied in accordance with this Specification to the Engineer upon request.

Corrugated Metal Culvert Pipe (CMP)

Corrugated metal culvert pipe for standard installations will conform to AASHTO M36 and be 2 2/3 inches by 1/2 inch galvanized corrugated steel pipe with a minimum 16 gauge for 12 to 24 inches diameter pipes and 14 gauge for 30 to 36 inch diameter pipes, unless otherwise indicated in the Plans or Specifications.

Excessive fill heights may necessitate heavier gauge or different corrugation dimensions. Corrosive soils may necessitate the use of aluminized corrugated steel pipe or corrugated aluminum pipe. List special CMP project requirements in the plans or special provisions.

Use apron endwalls compatible in material and connection detail with the culvert pipe.

P A R T 3 - E X E C U T I O N

ERECTION/INSTALLATION/APPLICATION

Install all pipe to the required lines and grades shown on the Plans.

Begin laying sewer pipe at the lowest point in the proposed sewer line. Install with the bell end of bell and spigot pipe or with the receiving groove end of tongue and groove pipe pointing upgrade. Complete pipe bedding, haunching, initial backfill and final backfill in accordance with Section 330500 Common Work Installation and Testing Piping Systems.

Grout solid concrete tapered plugs into lifting holes of RCP sections before initial backfill has been installed.

The manhole connection of pipe sewers are accomplished by one of the following methods:

a. When rigid pipe is connected to a concrete brick, block, or precast manhole within the manhole base, use support by block or brick.
b. Where the pipe enters the manhole above the manhole base, use support from the wall of the manhole back to the face of the first pipe joint bell with a wall of backfill concrete, brick, or solid concrete block columns.
c. Neatly brick or concrete to pipe into the manhole wall and coat the surface of the masonry work with a minimum of ¼ inch mortar and rub the surface smooth.

Install reinforced concrete aprons on the ends of corrugated polyethylene storm sewer pipe if endwalls are indicated in the plans. Fit corrugated PE pipe into bell of reinforced concrete apron.

Install galvanized trash guards on aprons only where indicated in the Plans.

Install joint ties for at least the last three joints for concrete pipe placed. If an apron endwall is used, tie the apron endwall joint and two additional pipe joints at each location. Joint ties are incidental to the pipe.

Use tracer wire for non-conductive storm sewer pipes (including service connections and private mains) unless the storm sewer has manholes, aprons or clean outs as a means of locating the underground pipe. Tracer wire will be brown for storm sewer.

METHOD OF MEASUREMENT/BASIS OF PAYMENT

If a unit price bid item is used for the item of work or if payment for the effort is itemized in some other manner by the contract, measure work in accordance with the applicable bid items. If no specific bid items are listed for items listed herein, all work is considered incidental to the project and disregard further provisions of this section.

The quantity of storm sewer pipe installed will be paid for at the contract unit price per linear foot in place and passing required tests. The quantity of apron endwalls installed will be paid for at the contract unit price per each. Do not include the length of the apron endwall in the length measured for pipe. No deduction from the measured length of pipe for intermediate drainage structures, junctions or fittings (except apron endwalls). The price paid is payment in full for furnishing all materials; forming foundation; sheeting and shoring; dewatering; laying pipe; sealing joints and making connections to new or existing fixtures; testing pipe; for backfilling; for furnishing granular bedding/haunching material; removing sheeting and shoring; cleaning and restoring the site of the work; and for all labor, tools, equipment and incidentals necessary to complete the work in accordance with the Contract, unless specific contract items are otherwise provided in the Contract.

END OF SECTION

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