STANDARD CONSTRUCTION SPECIFICATIONS

FORT • ATKINSON

May 2026

TABLE OF CONTENTS

INTRODUCTORY INFORMATION

PAGE	TITLE
00 01 01	Cover Sheet
00 01 10	Table of Contents
00 01 11	Preface
00 01 12	City Contacts
00 01 13	Definition of Terms
00 01 14	General

SPECIFICATIONS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION	TITLE
01 14 19	Use of Site
01 45 16.13	Contractor's Quality Control
01 57 23	Temporary Dewatering
01 60 00	Product Requirements
01 74 23	Final Cleaning

DIVISION 31 - EARTHWORK

SECTION	TITLE
31 11 00	Clearing and Grubbing
31 22 00	Grading
31 25 00	Erosion and Sedimentation Controls
31 32 19	Geogrid for Soil Stabilization
31 41 33	Trench Shielding

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION	TITLE
32 90 00	Restoration

DIVISION 33 - UTILITIES

SECTION	TITLE
33 05 00	Common Work Results For Utilities
33 11 00	Water Utility Distribution Piping
33 30 00	Sanitary Sewerage
33 40 00	Storm Drainage

DIVISION 34 - TRANSPORTATION

SECTION	TITLE
34 71 00	Roadway Construction

APPENDICES

Appendix A	Multi-Use Trail Standards
Appendix B	City Approved Plantings
Appendix C	Standard Detail Drawings

PREFACE

These Standard Construction Specifications were prepared with the purpose of providing convenient reference to City of Fort Atkinson requirements as they relate to sanitary and storm sewer, water mains, building services, roadways, multi-use trails, erosion control, and restoration.

This document shall serve as a guide for persons associated with the establishment of new developments, rehabilitation/maintenance projects, and City projects located in the City of Fort Atkinson. This document applies to prospective developers, design engineers, material suppliers, and construction contractors.

The specifications may not address all conditions of a project. In these cases, the Director of Public Works or their Designee shall authorize the use of substitute or “or-equal” item of material or equipment.

The City of Fort Atkinson requires Design Plan and Profile drawings for all proposed utility mains and structures, and a complete specification manual for all public bid projects. The specification manual shall include bidding requirements, contract forms, conditions of contract, general requirements, technical specifications, and any other pertinent information related to the project.

For more information, refer to the “City of Fort Atkinson Land Division and Development Ordinance” or as “Chapter 70 of the City of Fort Atkinson Municipal Code of Ordinances, Jefferson County, Wisconsin”. This Ordinance was adopted on February 17, 2022, and replaces the “Platting Code Subdivision Ordinance” adopted on September 7, 1993.

CITY CONTACTS

Department	Name	Email	Phone
City Manager	Rebecca Houseman	rhouseman@fortatkinsonwi.gov	(920) 397-9901
Director of Public Works	Zach Navin	znavin@fortatkinsonwi.gov	(920) 397-9901
City Engineer	Andrew Burt	aburt@ruekert-mielke.com	(262) 953-4153
Director of Neighborhood and Building Services	Jedidiah Draeger	jdraeger@fortatkinsonwi.gov	(920) 397-9901
Director of Parks and Recreation	Ben Dayton	bdayton@fortatkinsonwi.gov	(920) 397-9910
Wastewater Utility Superintendent	Erin Sweeney	esweeney@fortatkinsonwi.gov	(920) 397-9917
Water Utility Superintendent	Jeff Armstrong	jarmstrong@fortatkinsonwi.gov	(920) 397-9916
City Electrician	Nick Armstrong	narmstrong@fortatkinsonwi.gov	(920) 397-9903
Public Works Operations Superintendent	Tom Williamson	twilliamson@fortatkinsonwi.gov	(920) 397-9909

DEFINITION OF TERMS

AASHTO: American Association of State Highway and Transportation Officials.

ASTM: American Society for Testing and Materials.

As-Built Drawings: Design plans reviewed in the field and revised to show actual construction dimensions and quantities. The plan shall specify the location of all improvements where installed and include a description of the item including the type, make, materials used and any unusual characteristics. A single digital CAD file (.dwg) shall be provided to City at the end of construction. The CAD file shall be to scale and represent as-built conditions including the following, each on a separate layer name: building footprint; internal walkways; internal site parking; other impervious areas (i.e. gravel, crushed stone, asphalt, concrete, etc.); lot lines or parcel lines; lot/plat dimensions; and street names.

Building or Structure: Anything constructed or erected, the use of which requires more or less permanent location on ground or attached to something having permanent location on the ground. This does not include public utility fixtures and appurtenances.

Storm Water Technical Standards, Models and Best Management Practices (BMP's): Wisconsin Department of Natural Resources (WDNR) "Technical Standards" and tools used to plan, design, install, and maintain erosion/sediment control and storm water management practices to comply with Ch. NR 151 of the Wisconsin Administrative Code. More information can be found at: http://dnr.wi.gov/topic/stormwater/standards/index.html

Contract Documents: Includes the notice to bidders, instructions to bidders, bid proposal, affidavit of organization and authority, listing of subcontractors, bid bond, contract, performance bond, detailed specifications, general specifications, standard specifications, state specifications, construction plans, special provisions, wage rates, agency permits addenda, and notice to proceed. Also included are any contract change orders and agreements that are required to complete construction in an acceptable manner, including any authorized extensions, all of which constitute one instrument.

Contractor: An individual, company, firm, or other party or organization who contracts to construct all or a portion of a project.

Design Engineer: A professional engineer registered in the State of Wisconsin responsible for the design and preparation of contract documents.

Developer: Any person, firm, corporation, agent, partnership, or entity that seeks to improve land in accordance with the City's development regulations.

Development: A change to improved or unimproved real estate.

Easement: The area of land set aside or over or through which a liberty, privilege or advantage in land, distinct from ownership of the land, is granted to the public or some particular person or part of the public.

Erosion Control: Any method or means of controlling sediment carried in runoff from a construction site, as specified in the technical standards: http://dnr.wi.gov/topic/stormwater/standards/const_standards.html.

"Or Equal": An item determined by the City Engineer or Utility Director to be functionally equal to an item named within the approved plans and specifications.

Inspector: An authorized representative of the City assigned to provide detailed observation of construction and to serve as a liaison between the Contractor and the City. The inspector shall have no responsibility to the Contractor or Developer. The inspector will not supervise, direct, control or have

authority over or be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or safety precautions and programs incident thereto or for failure of Contractor to comply with any laws or regulations. Inspector shall not be responsible for Contractor's failure to perform the work. Inspector shall not be responsible for any acts, or omissions, of the Contractor, subcontractor, supplier or other individual/entity performing the work.

Owner: Any government, firm, association, partnership, private corporation, public or quasi-public corporation, or a combination of any of them, or other legal entity having sufficient proprietary interest in the land to be subdivided to commence and maintain proceedings to subdivide.

Parcel: A lot or tract of land.

Punch List: A list of project-related items requiring corrective action before final payment or acceptance of the completed project.

Right-of-Way (ROW): A public way dedicated to the public for its intended use.

Standard Specifications (SWS): Refers to the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and its revisions.

State Specifications: Refers to the Standard Specifications for Highway and Structure Construction, State of Wisconsin, Department of Transportation, current edition, and its supplements.

Subdivider: Any person, firm, corporation, partnership, or other entity that divides or proposes to divide, by plat or certified survey map.

Substitute: Any material proposed by the Contractor that does not meet the requirements of an "or equal" but is functionally equivalent to that named and is an acceptable substitute therefor.

Utility: Refers to the City of Fort Atkinson Water, Storm Water, or Wastewater Utility.

Wisconsin Administrative Code: The rules of administrative agencies having rule-making authority in the State of Wisconsin.

GENERAL

Specifications

The “Standard Specifications for Sewer and Water Construction in Wisconsin”, (SWS) Current Edition, with all addenda, will govern all utility work performed with the City and hereinafter will be referred to as the “Standard Specifications” or “SWS”. Reference to “State Specifications” shall be the “Standard Specifications for Highway and Structure Construction of State of Wisconsin, Department of Transportation”.

Substitute Materials

In the event the Contractor wishes to substitute a material for a named material or equipment. The Contractor shall identify all changes, related costs, additional time, and operational changes, in writing, prior to evaluation by the Director of Public Works or their Designee. The Contractor shall provide all necessary data, and information requested by the Director of Public Works. The Contractor shall bear any and all costs in providing the required data and evaluation by the Director of Public Works or their Designee. The Contractor shall not install any alternate/substitute materials without prior approval by the Director of Public Works or their Designee.

Existing Utilities

Developer is responsible for calling Digger’s Hotline and contracting with private locator to locate all underground utilities, both public and private, within proposed work area. Developers shall survey underground utilities and make them part of the proposed plans.

- Existing utilities that are potentially in conflict with proposed work or as directed by the Director of Public Works or their Designee shall be verified by Utility Line Opening (ULO). Cost for ULO’s are by Developer.
    - Perform the excavation according to Wisconsin State Statue 182.0175.
    - Perform the utility line openings as soon as possible to allow for review relevant design information and make necessary revisions to design and/or coordinate relocation with existing utility.
    - ULO’s within public right-of-way shall be approved by Director of Public Works or their Designee prior to commencing with work.
    - Notify the utility owner a minimum of 3 days before the work so they may be present.
    - Backfill the excavation with suitable backfill material, and thoroughly compact.

Work Schedule/noise Abatement

The Contractor/Developer, Design Engineer, or Agent thereof shall schedule a preconstruction conference with the City.

- Contractor shall submit a detailed work schedule to the City prior to the preconstruction conference.
- Construction shall be Monday through Friday, 7:00 am to 7:00 pm. Saturday work shall be at the approval and discretion of the City.
- No work on Sundays or holidays.

- Alterations to the planned work schedule require approval of the Director of Public Works or their Designee.
- Contractor will be responsible for maintaining all construction equipment in good working order for the duration of all approved construction activities

Project Completion and Acceptance

The Design Engineer, Developer, or Contractor/Developer shall initiate the acceptance of public improvements by notifying the City/Utility. The notification must be made in writing.

- The City/Utility shall conduct a final inspection, prepare a punch list of the deficiencies, and send it to the design engineer, developer, or contractor.
- Noted deficiencies shall be remedied to meet the City/Utility's requirements.
- Costs for any inspection and re-inspection will be incurred by Contractor/Developer.
- When all project related items have been addressed and/or corrected, the Contractor/Developer shall provide digital as-built file representing final construction.
- The City/Utility will then move to accept the project. Formal acceptance of the project, as complete, shall be provided in writing to the Contractor/Developer.

Easement and Construction License Agreement

The Developer shall obtain written permission from any off-site Property Owners if any work, materials, or equipment is proposed to be staged or take place outside of the project limits. The Contractor shall obtain and provide the City with copies of any, and all, appropriate lien release documents, for each agreement/easement grantor, indicating successful completion of any and all project related tasks. Said documents must be received prior to release of funds in the Letter of Credit.

Permits

The Developer shall obtain the necessary permits/approvals required for construction. Copies of these documents shall be provided to the City for review. The Contractor shall obtain all permits not provided by the Developer and shall be responsible for required fees. The Contractor shall give notice as required in SWS 1.2.8.

Highway/roadway

Construction within the right-of-way of any State, County, or Township Highway shall be governed by the applicable controlling agency and any issued permits, and the appropriate sections of the Specifications.

- Contractor shall be responsible for any and all requirements and permits of the controlling agencies.

Soil Borings

- Contractor is responsible to for contacting all utilities, as well as Digger's Hotline, before performing soil boring work.
- Contractors shall obtain permission from the City or Property Owners prior to performing subsurface investigations.

- Permits may be required, by State or County agencies, for work within streets or highways other than the City owned roadways.
- Soil borings shall not be taken within pavement or shoulder areas without the City's permission.
- All boring holes shall be completely filled after the work has been completed. Surface restoration material and methodology shall be approved by Director of Public Works or their Designee prior conducting soil borings.

Preconstruction Conference

Contractor shall schedule a preconstruction conference at a time and location selected by the City. The conference shall be attended by authorized representatives of the Contractor and City.

Safety

Contractor shall follow all necessary State and Federal safety regulations at all times.

- Contractor shall have a written safety program establishing safe practices and procedures, for the protection of persons and/or property. The submitted safety plan shall be followed throughout the construction period.
- City personnel shall follow the Contractor's specified written safety program.

Property Damage

All damaged private and public property (eg. landscape, trees, fences, culverts, and utility poles), including existing streets and underground utilities, shall be restored to the existing condition prior to construction. Contractor shall bear any and all related repair expense unless otherwise specified by the City.

Warranty

Contractor and/or Developer shall leave the entire system, for which they are responsible, in good working order and shall, at their expense, repair, reconstruct, remodel, and/or make whole, all defective labor and materials that may develop for a period of one-year (or the approved warranty period) from project final acceptance. The warranty period shall begin once final acceptance, by the City, has been given in writing. In no case will the warranty commence prior to the City's formal approval and acceptance of the completed work. Warranty provisions shall not prevent any claim, or claims, against the Developer, Developer's representative, Contractor, or subcontractors for negligence.

SECTION 01 14 19

USE OF SITE

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes requirements for Contractor's use of lands provided by Owner for the Work.

1.02 PROTECTION OF WORK

A. Openings and surface obstructions: Protect with barricades, signs, or other devices.

B. Street barricades, signs or other devices: Erect and maintain for public safety and convenience. Follow applicable Laws and Regulations. Generally, mark hazards within Work limits and on detours and around Work with well-painted, well-maintained barricades, reflectors, electric lights, flashers, and warning and directional signs in quantity and size to protect life and property. Locate and use safeguards to meet changing Work conditions.
1. Streets closed to through traffic: Place barricades at adjacent intersections.
2. Streets totally closed: At Director of Public Works' or their Designee's request, install snow fence across full width of streets or alleys.

C. Flagmen: Use when construction obstructs or endangers a traffic lane, and no marked detour is provided. Flagman shall direct traffic through or around congested area. Add flagging personnel at Director of Public Works' or their Designee's request.

D. Snow removal: Immediately remove snow from sections of streets obstructed by construction.

E. Property access: Do not block or unnecessarily interfere with pedestrian or vehicular access to property without Director of Public Works' or their Designee's approval.

F. Drainage: Do not obstruct. Prevent sediment from entering sewers.
1. Storm or groundwater from Site: Convey to a storm sewer inlet, or, with Director of Public Works' or their Designee's approval, another point of disposal. Use a continuous pipe of ample capacity and free of obstructions.
2. Sanitary sewerage: Convey by closed pipe or hose to a sanitary sewer inlet, or, with Director of Public Works' or their Designee's approval, to another point of disposal.
3. Existing structures: Restore to a condition at least equal to condition before disturbance. Obtain Director of Public Works' or their Designee's approval.

G. Facilities access: Maintain access to fire hydrants, fire alarm and police call boxes, water and gas valves, catch basins, and sewer, water utility and other manholes. If Work obstructs or interferes with any facility, coordinate with facility owner, and remove obstruction or interferences expeditiously.

H. Fencing.

1. Barrier fence: Plastic snow fence, 4-feet high, secured to driven steel posts at 10-feet maximum centers. Install at drip line of trees or locate a distance of 1.5 feet per inch diameter of tree away from the tree trunk, whichever is greater, wherever indicated on Drawings to protect trees.
2. Erect before construction activity begins and remove after Site Work is Substantially Complete, and after Director of Public Works or their Designee approval.

1.03 PROPERTY DAMAGE

1.04 SITE RESTRICTIONS

A. Cooperate with Owner's operating personnel and provide safe and appropriate access at all times. During construction, operation and normal maintenance of existing facilities will be Owner's responsibility.

B. Protect trees, shrubs, lawns, fencing and other existing features designated to remain. Maintain protection until landscaping Work is completed. Pay for reparation.

C. Utility pipe lines:
1. When, in Director of Public Works or their Designee's judgment, Contractor has obstructed or closed a street or is conducting operations at a greater scale than is necessary, Director of Public Works or their Designee may require Contractor to finish sections with work-in-progress before starting additional sections.
2. Length of open trench. Do not exceed:
   a. 250 feet at any one time.
   b. 100 feet opened in advance of completed pipe laying operations.
   c. Obstructing more than 1 street by one trench at any one time.

1.05 SITE ACCESS

A. Stay within public right-of-ways and easement limits.

B. Reasonable temporary access must be maintained to residences at all times. Notify residences of progression of operations prior to temporary closure of driveways. A minimum of 24 hours notice shall be given to a property owner before temporarily closing a driveway. Maintain access to all driveways during non-working hours.

C. Provide a minimum 48 hour written notice to Director of Public Works or their Designee and residents prior to commencing with mobilization, pipe laying, and at other stages of construction as determined by the Owner or Director of Public Works or their Designee.

D. Maintain emergency access at all times to all parcels.

E. Maintain access for garbage pickup at all times.

F. Maintain access for mail delivery at all times.

G. Maintain access for school buses.

1.06 EASEMENTS

A. Fulfill Owner's responsibilities regarding construction operations, access, maintenance, restoration, notice, traffic control as stated in the documents provided.

1.07 APPROVAL OF EASEMENT RESTORATION

A. Before final payment the Contractor shall send a notice, with correct names and addresses entered, to all easement grantors by certified mail, return receipt requested. Send an identical copy to the Owner and Director of Public Works or their Designee.

B. Owner will furnish Contractor with names and addresses of easement grantors.

C. Upon receipt of a notice of deficiency, Owner or Owner's representative will examine Site, and direct Contractor to complete all Work necessary to satisfy the terms of the Contract. Should Contractor refuse to comply, Owner may have the Work done by contract or force account and deduct the cost thereof from monies due Contractor. Should conditions exist which preclude the Contractor from completing satisfactory restoration, Owner may require Contractor to furnish a bond in a sum sufficient to cover any legal claims for damages. Owner may waive requirement if satisfied that Work has been completed in agreement with the Contract Documents and terms of the license or easement.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

SECTION 01 45 16.13

CONTRACTOR'S QUALITY CONTROL

PART 1 - GENERAL

1.01 CONTRACTOR'S QUALITY CONTROL

A. As a condition of acceptance, arrange, conduct, and pay for tests necessary to demonstrate satisfactory performance of equipment and systems installed under the Contract Documents. Make adjustments, repairs and corrections necessary to meet the requirements of the Specifications including the instructions of the supplier of any piece of equipment.

B. Conduct tests at full operating conditions and pressures equal to normal conditions of use. Except as Director of Public Works or their Designee may approve, no piece of equipment shall be tested for acceptance until the system of which the equipment is a part is complete and ready in all respects for use. Director of Public Works' or their Designee's approval shall not relieve Contractor from Contractor's obligations and responsibilities under the Contract Documents.

C. Inform all Subcontractors, Suppliers and other persons in connection with the testing of equipment and systems.

D. Contractor is responsible for the accuracy, fitting and protection of all Work. Verify measurements, locations, and quantities before proceeding with installations.

E. For each Specification section, inspect prevailing conditions before starting Work. Notify Director of Public Works or their Designee of conditions that may adversely affect proper completion.

F. Install and erect Work level, plumb, and neatly fitted.

G. Scales for weighing materials: Tested by a Sealer of Weights and Measures and shall bear a current stamp of approval.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 57 23

TEMPORARY DEWATERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Groundwater control system.

B. Removal of water encountered during excavating and construction.

1.02 RELATED SECTIONS

A. 31 25 00 - Erosion and Sedimentation Control.

1.03 REFERENCES

A. Wisconsin Department of Natural Resources Private Water Supply Section, Box 7921, Madison, Wisconsin 53707.

1.04 DESIGN REQUIREMENTS

A. Design and operate dewatering system to prevent removal of existing soils. Dewater open excavations from outside their structural limits and from a point below bottom of excavation.

B. Prevent water from rising above any footing, foundation, or bottom of trench until Work has been backfilled, protect 24-hours a day, weekends, and holidays.

C. Coordinate design and installation of sheeting, shoring, and bracing to facilitate water removal.

D. Dewatering methods and groundwater removal shall not damage existing property and structures, both on and near the Site, including private wells and water supplies.

1.05 PERFORMANCE REQUIREMENTS

A. Maintain groundwater table at least 1 foot below bottom of excavations and trenches (under normal excavating and pipe laying conditions).

B. Maintain water removal operations to accommodate work performed by others within Site.

1.06 REPAIRS

A. Protect existing property and structures from subsidence, flooding, and other damage, and be responsible to act during emergencies.

B. Assume responsibility for damage or loss arising from removal or disturbance of groundwater. Loss or damage includes but is not limited to reduction in water supply; substantial decrease in well capacity, water quality, or water levels; subsidence of soil; or damage to foundations, structures, and other property.

C. If a private well or water supply is interrupted or detrimentally affected during dewatering operations, provide potable water to the affected user until water supply is restored.

D. Contractor's indemnification responsibilities include claims relating to dewatering operations.

E. If Contractor fails to promptly respond to any claim arising from dewatering operations, or fails to correct damage resulting from dewatering operations, Owner may, after 7 days written notice to Contractor and without assuming Contractor's liability under the Contract Documents, proceed to correct the damage as Owner may deem necessary, and the costs thereof will be deducted from Contract Price. Owner's authority to act on behalf of Contractor will assume Contractor's dewatering activities were the causative factor of such damage.

1.07 REGULATORY REQUIREMENTS

A. If dewatering wells are used, seal and abandon following DNR requirements.

B. Obtain well permit from DNR Private Water Supply Section if dewatering wells will be installed or operated for which the single or aggregate capacity will exceed 70 gallons per minute.

C. Obtain written permission from authority having jurisdiction before using storm sewers, ditches, or other existing drainage facilities for water disposal.

D. Review of proposed groundwater control system by Director of Public Works or their Designee does not relieve Contractor of responsibility to comply with requirements of authorities having jurisdiction over Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 WATER REMOVAL

A. Maintain groundwater levels so construction occurs in dry conditions until backfilling is completed. Prevent flotation of structures from hydrostatic uplift forces. Provide reliable and adequate backup equipment.

B. Remove temporary structures and equipment from Site at Work completion.

C. Operate and maintain groundwater control system on a 24-hour-a-day and 7-days-per-week basis.

3.02 WATER DISPOSAL

A. Convey groundwater removed from Site through pipes to the point of discharge. Do not convey water in open ditches or trenches. Locate discharge point on vegetated or stabilized ground.

B. Follow 31 25 00 for disposal of dewatering discharge.

C. Prevent flooding damage to property.

D. Do not use existing drainage facilities in a manner which will obstruct their normal function or cause flooding or damage.

E. Upon completion of Work, remove temporary facilities and equipment and restore existing facilities as originally found.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Deliver products in original packaging. Show manufacturer's label on packages. Unidentifiable materials will be rejected.

B. Use materials and equipment which have National Board of Fire Underwriters (U.L.) listings and label service.

C. Follow manufacturer's instructions for delivery, storage, handling, protection, and installation.

1.02 STORAGE

A. Store materials on or off-Site following Laws and Regulations, manufacturer's instructions, and these requirements.

B. Protect materials stored on-Site from elements and incidental damage by watertight coverings or sheds with raised floors and suitably provided with barriers. Do not store materials on-Site which may interfere with construction or cause damage to property and structures.

C. CITY assumes no responsibility for materials stored on CITY’s property or in CITY's buildings on or off-Site.

1.03 HANDLING AND PROTECTION

A. Protect materials against damage during shipping and until the time of Owner’s possession of Work. After installation, protect materials from damage during subsequent construction activities. Repair or replace damaged Work as requested by Director of Public Works or their Designee.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 74 23

FINAL CLEANING

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. Remove waste and surplus materials, rubbish, and construction facilities from Site.

B. Clean ditches and storm sewers.

C. Sweep paved areas.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface debris removal.

B. Plant life and grass removal.

C. Tree and shrub removal.

D. Tree and shrub root system removal.

1.02 QUALITY ASSURANCE

A. Regulatory requirements:
   1. Conform to applicable local code for disposal of debris.
   2. Coordinate Work with utility companies.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PROTECTION

A. Do not disturb buried utilities, benchmarks, nor adjacent property.

3.02 CLEARING

A. Clear areas required for access to Site and execution of Work.

B. Clear undergrowth and deadwood without disturbing subsoil, in affected area.

C. Remove debris, rock, and extracted plant life from Site.

D. Unless shown as a Contract requirement, do not remove trees without City's approval.

END OF SECTION

SECTION 31 22 00

GRADING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Topsoil removal, stockpiling, and replacement.

B. Rough grading, leveling.

C. Ditches, swales.

D. Storm water management facilities.

E. Bioretention facilities.

F. Infiltration facilities.

G. Rock Excavation.

H. Borrow.

1.02 RELATED SECTIONS

A. 01 45 16.13 - Contractor's Quality Control.

B. 31 25 00 - Erosion and Sedimentation Controls.

1.03 REFERENCES

A. Technical Standard: Wisconsin Department of Natural Resources (DNR) Storm Water Post-construction Technical Standards: http://dnr.wi.gov/topic/stormwater/standards/postconst_standards.html.

B. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.

1.04 DEFINITIONS

A. Rock excavation:
1. It is assumed that all excavations to levels and dimensions required by the Contract Documents are earth excavation. Earth excavation includes removal and disposal of all materials encountered except rock/sound bedrock which is defined as natural materials which:
a. cannot be excavated with a minimum 3/4 cubic yard capacity backhoe without drilling or blasting;

b. cannot economically remove with a one-tooth ripper on a D8 Caterpillar (or equivalent);
c. requires the use of special equipment such as a pneumatic hammer;
d. requires the use of explosives (after requiring written permission of Owner).

2. Examples of materials classified as rock are bedrock, rock in ledges, and rock-hard cementitious aggregate deposits.
3. Presence of rock as defined above shall be confirmed by Geotechnical Engineer prior to commencing with rock excavation.
4. Do not proceed with rock excavation work until Director of Public Works or their Designee has taken the necessary measures to determine quantity of rock excavation required to complete the Work. Measurements will be taken after being properly stripped of earth by the Contractor.
5. Excavation in weathered bedrock layer as shown in boring logs and discussed in geotechnical report will not be considered as rock excavation.

B. Unclassified excavation: Follow State Specifications 205. Work to perform construction of roadway to subgrade will include unclassified excavation.

C. Excavation below subgrade: Deposits below proposed finished grade of frost-heave material, unstable silty soils, water bearing soil, topsoil containing considerable amounts of humus or vegetable matter, or other undesirable foundation material.

D. Borrow: Material imported from off-Site includes soil or a mixture of soil, stone, gravel or other materials of a character and quality for purposes intended, free from sod, stumps, logs, brush, and other organic, perishable, and deleterious matter. Material shall fulfill Contract requirements and be approved by Director of Public Works or their Designee.

1.05 PERFORMANCE REQUIREMENTS

A. Minimum soil bearing capacity of road subgrades: 2500 PSF.

1.06 QUALITY ASSURANCE

A. Use approved soils engineer to verify quality of all soils.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fill materials:
1. Satisfactory soil or a mixture of satisfactory soil, stone, gravel or other acceptable materials of a character and quality satisfactory for purpose intended.
2. Free of deleterious, organic, or frozen matter.
3. Contain no chemicals that may result in materials being classified as contaminated.
4. Low - expansive with maximum Liquid Limit and Plasticity Index following ASTM D4318 of 30 and 15, respectively, unless specifically tested and determined to have low expansive properties and are approved by soils engineer.
5. Top 12 inches of compacted fill; maximum three-inch particle diameter.
6. All underlying compacted fill; maximum six-inch particle diameter.
7. Tested and approved by soils engineer before placement.
8. Use non-organic soils for embankments for storm water management facilities. Follow Technical Standard 1001.
9. Storm water facility core trench or keyway use same material as embankment.

B. Detention pond liner:
   1. Follow Technical Standard 1001 Appendix D.

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify designed lines, levels, contours, and datum.

B. Remove vegetation, organic or other deleterious materials from areas to be cut and filled.

C. Remove a minimum of six inches of parent material (including all vegetation, stumps, etc.) beneath the proposed base of embankments.

D. Remove and stockpile topsoil from areas within grading limits.

E. Proof roll subgrades in presence of soils engineer prior to placement of fill materials to detect soft, wet, or unstable materials to be undercut. Correct any such areas.

F. Control erosion of soil. Follow Sections 01 57 13 and 31 25 00.

G. All compacted fill, subgrades, and grades shall be underlain by suitable bearing material.

H. Scarify top six to ten inches of subgrades.

I. Moisture condition subgrade soils as necessary and recompact to minimum density required for fill materials prior to placement of fill materials.

J. Recompact and retest previously compacted intermediate fill surfaces damaged by weather or construction equipment before resumption of filling operations.

K. Moisture condition all soils designated for use as fill material before placement.

3.02 Preparation of bioretention areas.

A. Identify designed lines, levels, contours and datum.

B. Remove vegetation, organic or other deleterious materials from areas to be cut and filled.

C. Remove and stockpile topsoil from areas within grading limits.

D. Control erosion of soil. Follow Section 31 25 00.

E. Scarify top six to ten inches of subgrades.

F. Pre-mix engineered soil mix on site: Follow Technical Standard 1004.

3.03 TOLERANCES

A. Minimum tolerances after compaction:
   1. Pavement subgrade: plus 1 inch to minus 1 inch.
   2. All other areas: plus, or minus 2 inches.

3.04 EARTHWORK CONSTRUCTION – BIORETENTION AREAS

A. Follow Technical Standard 1004.

B. Water each soil lift after placement until just saturated and allow to settle for 24 hours before placement of subsequent lift on top.

C. Perform construction work in bioretention areas with light-weight, wide-tracked equipment to minimize disturbance and compaction.

3.05 EARTHWORK CONSTRUCTION – INFILTRATION AREAS

A. Follow Technical Standard 1003.

3.06 EARTHWORK CONSTRUCTION

A. Provide sufficient drainage of completed or partially completed earthwork to prevent damage or loss due to rainfall, surface water or any other cause. Recondition or remove unstable materials resulting from improper operations, inadequate drainage, or overwatering, and restore or replace with stable material.

B. Undercut or underfill all areas to depth necessary to provide specified amount of topsoil to be placed and finished to grade lines and sections shown on Drawings.

C. Place materials in fill areas in uniform level lifts.
1. Sandy/gravely materials: 10–12-inch lifts maximum.
2. Clayey/silty materials: 6–8-inch lifts maximum.
3. Rock materials: Lifts not exceeding approximate average size of larger rocks, provided individual pieces are placed to prevent nesting and all voids filled with smaller stones and satisfactory soil or rock fines forming dense and compact mass.
4. Director of Public Works or their Designee is final judge of soil types.
5. Select compaction equipment specifically designed for soil compaction based upon type of material being compacted and layer thickness.

D. Materials placed in upper 1 foot of embankments or within 1 foot of piping or other structures; maximum 3-inch particle diameter.

E. In the immediate vicinity of minor structures and Underground Facilities, in holes, around and under isolated individual rock fragments, and elsewhere where embankment and filling materials cannot be or are not reached by normal compaction equipment, compact with machine-operated pneumatic or mechanical tampers, or with hand methods, as required to ensure intimate contact between the backfill material and the structure and to provide thorough compaction.

F. Blend embankments and slopes uniformly into adjacent areas.

G. Blend areas along exterior grading limits into existing ground grades 5 feet within Site at maximum 3 horizontal to 1 vertical slope.

H. Excavation Below Subgrade must be authorized by Director of Public Works or their Designee before Contractor's operation. 12 inches to 24 inches maximum.

I. Minimize dispersion of dust from grading operations by application of water or other approved dust control materials at Contractor's expense.

J. All earthwork shall be considered unclassified.

3.07 COMPACTION REQUIREMENTS

A. In areas where materials are moisture-density testable (including storm water facility embankments):
1. Tested for compaction as follows:
   a. Moisture and density: Follow ASTM D698 (Standard Proctor).
2. Shall meet the following moisture content, density, and deflection requirements, each of which has equal weight and each of which must be satisfied:
   a. Moisture content at the time of compacting the materials shall be prepared to within minus 1 to plus 3 percent of optimum moisture content for cohesive soils and minus 3 to plus 3 percent of optimum moisture content for granular soils. Material which does not contain sufficient moisture to obtain proper compaction shall be wetted, and thoroughly mixed. Material containing an excess of moisture shall be dried by manipulation, aeration, drainage, or other means before being compacted.
   b. After compaction of each layer, the density shall be at least:
      1) Minimum 95 percent of maximum dry density for pavement subgrades, to a depth of 1 foot below established subgrade elevation as determined by following ASTM D698 (Standard Proctor).
      2) Minimum 95 percent of maximum dry density for fill depths less than twenty feet as determined by following ASTM D698 (Standard Proctor).
      3) Where structural fills exceed twenty feet in height, portions below twenty feet shall have minimum 98 percent of maximum dry density as determined by following ASTM D698 (Standard Proctor).
   c. In addition to moisture-density testing, each compacted layer shall be observed by soils engineer for deflection or reaction under moving loaded triaxle dump truck to verify that no soft or pumping areas remain in any layer or foundation soil. Correct any such areas.

B. In areas where materials are not moisture-density testable because rock fragments in material prevent moisture-density testing:
1. Tested for compaction as follows:
   a. Shall meet the following moisture content and deflection requirements, each of which has equal weight and each of which must be satisfied:
      1) Moisture content at the time of compaction shall allow the material to be readily compacted to form a dense and compact mass, free of pumping. This may require aeration or wetting to achieve.
      2) Each compacted layer shall be observed by soils engineer for deflection or reaction under moving loaded triaxle dump truck to verify that no soft or pumping areas remain in any layer or foundation soil. Correct any such areas.

C. Bioretention areas.
1. Compaction avoidance: Follow Technical Standard 1004.
2. Compaction remediation: Follow Technical Standard 1004.

D. Infiltration areas.
1. Compaction mitigation: Follow Technical Standard 1003.

3.08 DETENTION POND LINERS

A. Follow Technical Standard 1001 including Appendix D.

3.09 EXCAVATED MATERIAL

A. Remove surplus excavation from Site.

B. Stockpiling: As space permits, stockpile excavated materials which are suitable and necessary for reuse on-site. Do not locate stockpiles in areas which will interfere with other work or could result in damage to structures and property. No runoff from stockpiles may enter waterways unless sedimentation control is provided.

3.10 ROCK EXCAVATION

A. Contractor is solely responsible for means and methods of rock removal. No blasting will be allowed.

B. When rock is encountered, notify Director of Public Works or their Designee and strip rock of all earth and shale. Allow Director of Public Works or their Designee time to make measurements of rock before proceeding with rock removal. Any rock removed prior to being measured by Director of Public Works or their Designee shall not be considered rock excavation.

3.11 PROTECTION

A. Employ measures to prevent cave-ins or loose soil from falling into excavation.

B. Protect bottom of excavations and soil adjacent to and beneath foundations from freezing.

C. Protect subsurface utilities encountered. Notify Director of Public Works or their Designee when encountered. Record location and repair, as necessary.

3.12 FIELD QUALITY CONTROL

A. Arrange soil technician access to Site to:
1. Inspect all excavated subgrade surfaces.
2. Verify earthwork compliance.

B. Employ a third party qualified testing service to:
1. Monitor the Work.
2. Verify soil bearing pressures
3. Perform compaction testing.
4. Verify compaction means and acceptability.

C. Make daily reports to Director of Public Works or their Designee.

D. Perform representative compaction tests at disturbed and fill areas.

E. Proof roll compacted fill surfaces under utilities, structures, driveways, and pavements.

F. If compaction is unsatisfactory, direct testing service to make additional in-place density and moisture tests to determine the extent of recompaction Work required. Perform corrective compaction.

G. Immediately advise Director of Public Works or their Designee of surfaces with inadequate soil bearing values.

3.13 FINAL CLEANUP

A. Follow State Specifications 104.

B. At grading completion, remove all temporary erosion control structures and devices (ponds, pipes, dikes, riprap, etc.) except Site perimeter silt fence. Reconstruct affected areas to finished grading plan contours and placement specifications.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Products and practices to temporarily and permanently control surface water runoff, soil, and sediment during and after construction.

1.02 RELATED SECTIONS

A. 32 90 00 - Restoration

B. 33 05 00 - Common Work Results for Utilities.

C. 34 71 00 - Roadway Construction.

1.03 REFERENCES

A. Technical Standard: Wisconsin Department of Natural Resources (DNR) Storm Water Construction Technical Standards: http://dnr.wi.gov/topic/stormwater/standards/const_standards.html

B. SWS Chapter 2.8.0

C. PAL: Wisconsin Department of Transportation Erosion Control Product Acceptability List: http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/tools/pal/default.aspx

1.04 REGULATORY REQUIREMENTS

A. Comply with laws prohibiting pollution of any lake, stream, river, or wetland by dumping refuse, rubbish, dredge material, or debris therein.

B. Construction project activities that disturb **one acre or more** of land through clearing, grading, excavating, or stockpiling of fill material require coverage under DNR Construction Site Storm Water Runoff General Permit.

C. One and two family residential sites, and sites greater than one acre including both private and public infrastructure sites require coverage under the City of Fort Atkinson Erosion Control Permit.

1.05 QUALITY CONTROL

A. Construct and maintain erosion sediment control measures following the appropriate Technical Standard.

B. When facilities are erected as shown on Drawings, contact Director of Public Works or their Designee for an inspection. Check facilities weekly and within 24 hours following rainfall events over 1/2 inch. Make needed repairs within 24 hours.

C. Director of Public Works or their Designee will be sole judge of the adequacy of Contractor's erosion control efforts and the City may suspend or limit the Contractor's operations pending adequate performance of any temporary or permanent erosion control measures requested by Director of Public Works or their Designee.

PART 2 - PRODUCTS

2.01 SLOPE INTERRUPTION OR PERIMETER CONTROL

A. Silt Fence. Follow Technical Standard 1056.

B. Manufactured perimeter control and slope interruption products. Follow Technical Standard 1071 Class II. Use PAL listed products and submit product data.

C. Sediment bale barrier. Follow Technical Standard 1055.

D. See Section 01 14 19 for barrier, tree protection or security fencing.

2.02 EROSION MATS

A. Non-channel erosion mat Class 1 Urban, Type A. Follow Technical Standard 1052.

B. Channel erosion mat Class 1, Type B. Follow Technical Standard 1053.

C. Use PAL-listed product(s) and submit product data.

2.03 SILT CURTAIN (DOT SILT SCREEN)

A. Follow Technical Standard 1070.

2.04 TURBIDITY BARRIER

A. Follow Technical Standard 1069.

2.03 GEOTEXTILE FABRIC

A. For subgrade reinforcement under riprap and stone tracking pad: Follow State Specification 645.2. Use Type R.

B. Use PAL-listed product(s) and submit product data.

2.04 STONE TRACKING PAD

A. Follow Technical Standard 1057.

2.05 DITCH CHECKS

A. Follow Technical Standard 1062 and as follows:
1. Manufactured. Use PAL-listed product and submit product data.

2.06 DUST CONTROL

A. Follow Technical Standard 1068. If using soil tackifier or stabilizer, or chlorides, submit product data.

2.07 SOIL TACKIFIERS AND STABILIZERS

A. Interim sediment control by water application. Follow Technical Standard 1051. Use PAL-listed product(s) and submit product data and applicator name.

B. Land application. Follow Technical Standard 1050. Use PAL-listed product(s) and submit product data for PAL-listed product.

C. Perform bench test in field with manufacturer's representative to verify proposed polymer reacts effectively with each site-specific representative soil found on the site. Provide certification from manufacturer's representative.

2.08 MULCH

A. For temporary construction Site erosion control follow Technical Standard 1058.

2.09 SEDIMENT TRAP

A. Follow Technical Standard 1063. Submit product data for PAL-listed components.

2.10 SEDIMENT BASIN

A. Follow Technical Standard 1064.

2.11 SEEDING

A. For temporary construction Site erosion control follow Technical Standard 1059.

B. For permanent landscaping follow 32 90 00.

2.12 INLET PROTECTION

A. Follow Technical Standard 1060. Use PAL-listed product(s) and submit product data.

2.13 DEWATERING

A. Follow Technical Standard 1061.

B. For temporary dewatering follow 01 57 23.

2.14 RIPRAP

A. Follow State Specifications 606.2. Use Riprap Light classification.

PART 3 - EXECUTION

3.01 GENERAL

A. Install temporary devices before construction activities begin and completely remove above and below grade after Site is stabilized and after Director of Public Works' or their Designee's approval.

B. Proceed carefully with construction adjacent to stream channels to avoid washing, sloughing, or deposition of materials into stream. If possible, dike-off work area and reduce volume and velocity of water that crosses disturbed areas with planned Engineering works (diversion, detention basins, berms).

C. Unless noted on Drawings, do not remove trees and surface vegetation.

D. Expose the smallest practical area of soil at any given time through construction scheduling. Make the duration of such exposure before application of stabilization measures as short as practicable.

3.02 SLOPE INTERRUPTION OR PERIMETER CONTROL INSTALLATION

A. Silt fence: Follow Technical Standard 1056.

B. Manufactured products: Follow Technical Standard 1071.

C. Sediment bale barrier: Follow Technical Standard 1055 and State Specification 628.3.3.

3.03 EROSION MAT INSTALLATION

A. For non-channel erosion mat follow Technical Standard 1052.

B. For channel erosion mat follow Technical Standard 1053.

3.04 SILT CURTAIN (SILT SCREEN) INSTALLATION

A. Follow Technical Standard 1070.

3.05. TURBIDITY BARRIER

A. Follow Technical Standard 1069.

3.06 GEOTEXTILE FABRIC

A. Follow State Specifications 645.3.

3.07 STONE TRACKING PAD

A. Follow Technical Standard 1057.

B. Install at points of vehicular access at the construction Site.

C. Inspect daily and repair as necessary or upon Director of Public Works or their Designee's request.

3.08 DITCH CHECKS

A. Follow Technical Standard 1062.

B. Entrench manufactured products a minimum of 2-inches on bare soil.

3.09 CONSTRUCTION SITE DIVERSION

A. Follow Technical Standard 1066.

3.10 DUST CONTROL

A. Follow Technical Standard 1068.

3.11 GRADING FOR EROSION CONTROL - TEMPORARY

A. Follow Technical Standard 1067.

3.12 SOIL TACKIFIERS & STABILIZERS

A. Follow Technical Standard 1051 for interim sediment control for water application.

B. Follow Technical Standard 1050 for land application.

3.13 MULCHING

A. For temporary construction Site erosion controls follow Technical Standard 1058.

3.14 SEDIMENT TRAP

A. Follow Technical Standard 1063.

3.15 SEDIMENT BASIN

A. Follow Technical Standard 1064.

3.16 SEEDING

A. For temporary construction Site erosion control follow Technical Standard 1059.

B. For permanent landscaping follow 32 90 00.

3.17 INLET PROTECTION

A. Follow Technical Standard 1060.

3.18 DEWATERING

A. Follow Technical Standard 1061 for removing sediment from water generated from dewatering activities, including trench dewatering.

B. Choose dewatering sediment removal method following Technical Standard 1061 and its Dewatering Practice Selection Matrix Figure 2.

C. Modify dewatering method as necessary for actual field soil conditions.

D. Follow 01 57 23 for dewatering and groundwater control systems.

3.19 RIPRAP INSTALLATION

A. Follow State Specifications 606.3.

END OF SECTION

SECTION 31 32 19

GEOGRID FOR SOIL STABILIZATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Geogrid reinforcement of embankments, base course, subbase course, or subgrade.

1.02 RELATED SECTIONS

A. 34 71 00 - Roadway Construction.

1.03 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO Recommended Practice for Geosynthetic Reinforcement of the Aggregate Base Course of Flexible Pavement Structures, AASHTO PP46-01, April 2001 Interim Edition of the AASHTO Provisional Standards.
2. Standard Specification for Highway Bridges (1997 Interim).
3. AASHTO Guide for Design of Pavement Structures (1993).

B. American Society of Civil Engineers (ASCE).
1. Giroud, J.P., and Han, J. (2004). "Design method for geogrid-reinforced unpaved roads. Part I - Development of design method." Journal of Geotechnical and Geoenvironmental Engineering, 130 (8), 775-786.
2. Giroud, J.P., and Han, J. (2004). "Design method for geogrid-reinforced unpaved roads. Part II - Calibration and applications." Journal of Geotechnical and Geoenvironmental Engineering, 130 (8), 787-797.

C. American Society for Testing and Materials (ASTM):
1. ASTM D1388-96 - Standard Test Method for Stiffness of Fabrics, Option A.
2. ASTM D4355 - Standard Test method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
3. ASTM D4759 - Standard Practice for Determining the Specification Conformance of Geosynthetics.
4. ASTM D5732 - Standard Test Method for Stiffness of Nonwoven Fabrics Using the Cantilever Test.
5. ASTM D6637 - Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-rib Tensile Method.
6. ASTM D7748 - Standard Test Method for Flexural Rigidity of Geogrids, Geotextiles and Related Products.

D. European Committee For Standardization (EN) EN 12224 Weathering Resistance-Resistance to loss of load capacity when subjected to ultra-violet light and weathering assessment in accordance with ISO 13434: 1999 7.2.

E. Geosynthetic Research Institute (GRI):
1. GRI-GG2-05 - Standard Test Method for Geogrid Junction Strength.
2. GRI-GG1-87 - Standard Test Method for Geogrid Rib Tensile Strength.

F. International Standards Organization (ISO)
1. ISO 10319: 1996 Wide width Tensile Tests, Radial stiffness determined from tensile stiffness measured in any in-plane axis.
2. ISO 13434: 1999 Guidelines for the Assessment of Durability of Geosynthetics.
3. ISO 12960 Resistance to loss of load capacity when subjected to chemically aggressive environments as part of a durability assessment in accordance with ISO 13434: 1999 7.3.

G. U.S. Army Corps of Engineers (USACOE)
1. Draft specification for Grid Aperture Stability by In-Plane Rotation.
2. CW-02215 Determination of Percent Open Area.

1.04 DEFINITIONS

A. Aperture stability (also known as torsional rigidity or torsional stiffness): In-plane torsional rigidity measured by applying a 20 kg/cm moment to central junction of 225mm square specimen restrained at perimeter following U.S. Army Corps of Engineers Methodology for Measurement of Torsional Rigidity, (Kinney, T.C. Aperture stability Modulus ref 3, 3-1-2000).

B. Base reinforcement: Placement of a geogrid beneath or within the aggregate base course of a flexible pavement system to improve the system stiffness.

C. Chemical degradation resistance: Resistance to loss of load capacity following ISO 12960 testing as part of a durability assessment following ISO 13434: 1999 7.3.

D. Geogrid: Polymeric grid formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth to function primarily as reinforcement.

E. Junction efficiency: Load transfer capability following GRI-GG2-05 and GRI-GG1-87 or ASTM D6637: Percentage of ultimate tensile strength.

F. Junction strength: Breaking tensile strength of junctions when tested following GRI-GG2 as modified by AASHTO Standard Specification for Highway Bridges, 1997 Interim, using a single rib having the greater of 3 junctions or 8 inches and tested at a strain rate of 10 percent per minute based on this gauge length.

G. Radial stiffness: Determined from tensile stiffness measured in any in-plane axis from testing following scope of ISO 10319: 1996.

H. Subgrade improvement: Placement of a geogrid immediately over soft subgrade soil to improve bearing capacity and mitigate deformation of subgrade soil.

I. Ultraviolet light and weathering resistance: Resistance to loss of load capacity following EN 12224 as part of a durability assessment following ISO 13434: 1999 7.2.

1.05 PERFORMANCE REQUIREMENTS

A. Subgrade improvement applications: Reinforcement benefit attributed to geogrid shall be as derived by Giroud-Han Method (2004). Appropriate partial safety factors shall be applied to results obtained using geogrids having properties or characteristics outside the range of rigorous model validation.

B. Base reinforcement applications: The structural enhancement attributed to proposed geogrid material shall be supported by evaluation and documentation of testing of the specific geogrid conducted in representative, laboratory conditions with repetitive loading applied by a circular plate or a passing wheel load of at least 4,500 pounds per single wheel or 9,000 pounds per dual wheel.

1.06 QUALITY ASSURANCE

A. Before geogrid installation, arrange a pre-installation conference at Site. Notify Director of Public Works or their Designee at least three (3) business days before meeting. A representative of geogrid supplier shall be available on an “as needed” basis during construction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Storage and protection:
1. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from contacting or affixing to geogrid materials.
2. Store at temperatures above minus-20 degrees F.
3. Rolled materials may be laid flat or stood on end.
4. Do not leave geogrid materials directly exposed to sunlight for longer than manufacturer’s recommended time.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Tensar Corporation, Morrow, GA, or their designated representative.

B. Approved equal.

2.02 MATERIALS

A. Structural soil reinforcement Bi-Axial geogrid: Integrally formed and deployed as a single layer having the following characteristics:

Bi-Axial Geogrid Type	Test Method	Units	BX Type 2
Index Properties:			
Aperture shape			rectangular
Minimum Aperture Dimensions (nominal)		inches	1.0x1.3
Maximum Aperture Dimensions (nominal)		inches	1.5x1.5
Minimum rib thickness (nominal)		inches	0.05x.0.05
Tensile strength @ 2% strain	ASTM D6637-01	Lb/ft	410x620
Tensile strength @ 5% strain	ASTM D6637-01	Lb/ft	810x1,340
Ultimate tensile strength	ASTM D6637-01	Lb/ft	1,310x1,970
Structural Integrity:			
Junction efficiency	GRI-GG2-05	%	93
Flexural stiffness	ASTM D7748/ASTM D5732-01	mg/cm	750,000
Aperture stability	USACOE torsional rigidity	n-m/deg	0.65
Durability:			
Resistance to installation damage (SC/SW/GP soil)	ASTM D6637-01	%	95 / 93 / 90
Resistance to long-term degradation	ASMT D6637-01	%	100
Resistance to UV degradation	ASTM D4355-05	%	100

PART 3 - EXECUTION

3.01 EXAMINATION

A. Check geogrid upon delivery to verify proper material has been received. Ensure material is free of damage from manufacturing, shipping, and handling.

3.02 PREPARATION

A. Prepare subgrade soil following Drawings.

B. Do not allow vehicle traffic of any kind on subgrade or geogrid before base course placement.

3.03 INSTALLATION

A. Follow manufacturer's installation guidelines.

B. Temporarily secure geogrid in place with ties, staples, pins, sandbags, or backfill as required by fill properties, fill placement procedures, or weather conditions.

3.04 GRANULAR FILL PLACEMENT OVER GEOGRID

A. Place granular fill material in lifts and compact following 34 71 00. Place, spread, and compact granular fill material so development of wrinkles, and movement of geogrid is minimized.

B. Place at least 8 inches of loose fill over geogrid before allowing tracked vehicle traffic. Minimize tracked vehicle turning to prevent tracks from displacing fill and damaging geogrid. When substrate carries traffic with minimal rutting, rubber-tired equipment may travel upon at speeds less than 5 MPH. Avoid sudden braking and sharp turning movements.

C. Use static compaction devices. Do not use vibratory compaction equipment.

3.05 INSPECTION

A. Director of Public Works or their Designee may randomly inspect geogrid before, during, or after (using test pits) installation.

3.06 REPAIR

A. Replace damaged geogrid rolls, regardless of whether before, during, or after installation.

B. Repair or replace damage and defects (i.e., frayed coating, separated junctions, separated layers, tears, etc.).

C. Replacement includes the defective area plus 3 feet past all four sides of affected area.

3.07 PROTECTION

A. Follow manufacturer’s recommendations for sunlight protection and exposure.

END OF SECTION

SECTION 31 41 33

TRENCH SHIELDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Open-cut pipeline trench cave-in and ground movement prevention measures.

1.02 SYSTEM DESCRIPTION

A. Use sheeting and bracing equipment and procedures that protect life, property, and the Work. Prevent trench cave-in, ground movement, disturbance of completed Work, and disturbance of surface or subsurface structures.

PART 2 - PRODUCTS

2.01 PORTABLE TRENCH BOX OR SLIDING TRENCH SHIELD

A. Provide a minimum 6-inch horizontal clearance between pipe and inside face of shield.

B. Use models approved by Wisconsin Department of Commerce; and applicable Laws and Regulations.

PART 3 - EXECUTION

3.01 PORTABLE TRENCH BOX OR SLIDING TRENCH SHIELD

A. Move trench box or shield ahead in a manner to avoid pulling already jointed pipe apart, and to avoid creating voids around the pipe wall.

B. Accurately reposition pipe that moves because of trench box or shield movement.

C. Immediately fill pipe zone area voids between the undisturbed trench wall and the trench box or shield when a trench box or shield is positioned. Use crushed stone chips or granular backfill.

D. Where a concrete cradle or envelope is required:
1. Provide a spacer between concrete and shield.
2. Use tar paper or equal bond-breaking material to separate the spacer and concrete, and to permit shield movement without disturbing pipe, cradle, or envelope.

3.02 CLOSED SHEETING

A. Position to prevent soil from entering the trench from below or through sheeting.

B. Closed sheeting may be set in place rather than driven if ground conditions are suitable and if trench is adequately spot braced prior to sheeting placement. Immediately fill voids behind sheeting with approved granular backfill.

C. Where sheeting is driven below the top of a concrete cradle or envelope, use tar paper or equal material to break the bond between the concrete and sheeting to permit sheeting removal.

D. Protect existing above and below grade property, facilities, piping and structures, including those located off-site.

3.03 SHEETING AND BRACING REMOVAL

A. Remove all components that are within 3 feet below the established street grade or the existing surface grade, whichever is lower. This includes sections ordered left in place.

B. Remove before trenches are flooded and after backfilling is complete or at an elevation to permit safe removal.

C. Remove bracing, except that ordered left in place, when backfilling has reached the respective level of such bracing.

END OF SECTION

SECTION 32 90 00

RESTORATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Topsoil.

B. Permanent seeding. Includes nurse crops.

C. Sodding.

D. Plantings.

E. Fertilizing.

F. Maintenance.

G. Mulching.

H. Edging.

I. Restoring utility company trenches.

1.02 RELATED SECTIONS

A. 31 25 00 - Erosion and Sedimentation Control. Includes temporary seeding (cover crop) for erosion control.

1.03 REFERENCES

A. ASNS: American Standard for Nursery Stock, ANSI; Z60.1 by the American Association of Nurserymen.

B. Technical Standard: Wisconsin Department of Natural Resources (DNR) Storm Water Construction Technical Standards: http://dnr.wi.gov/topic/stormwater/standards/const_standards.html

C. DNR Specification: Wisconsin Department of Natural Resources Specifications S100-Compost: http://dnr.wi.gov/topic/stormwater/documents/specifications S100Compost.pdf.

1.04 DEFINITIONS

A. Weeds: Bent grass, bermuda grass, bindweed, bird's-foot trefoil, blackberry, brome grass, canada thistle, chickweed, crabgrass, cress, crown vetch, dandelion, foxtail, garlic mustard, horsetail, jimsonweed, johnson grass, lambs quarter, leafy spurge, morning glory, mustard, narrow-leaved cattail, nimble will, nutgrass, nut sedge, perennial sorrel, poison ivy, poison oak, purple loosestrife, quack grass, ragwort, reed canary grass, rush grass, spotted knapweed, sweet clover, tansy, teasel, wild parsnip.

B. Plants: Living trees, shrubs, and herbaceous plants specified in this Section.

C. Defective: See General Conditions 1.02. Includes plants that are dead, show disease, weakness, or probability of death.

D. Full growing season: Period from April 15 to November 15.

1.05 DELIVERY STORAGE AND HANDLING

A. Ship, store, and handle seed to ensure protection from moisture, heat, rodents, and other conditions that jeopardize viability and cause germination before installation. Discard damaged seeds.

B. Deliver and store plant plugs to protect from drying winds and direct sunlight. Store plugs in shaded locations and maintain moist packing soil until planting.

C. Dig and handle plant stock to prevent injuries to trunk, branches, and roots. Prevent tops from drying during transport. Handle plants by earth balls or containers.

1.06 SCHEDULING

A. Perform permanent turf grass seeding between March 15 and October 1. Outside these dates temporarily stabilize Site following 31 25 00. Dormant seed between November 15 and December 15.

B. Perform native plant seeding in spring before June 15 or after September 15 and before ground is snow-covered. Between June 15 and September 15 temporarily stabilize Site following 31 25 00.

C. Plant native plant plugs between March 30 and August 31.

D. Apply herbicide between April 1 and October 1.

1.07 WARRANTIES

A. Correction Period: One year that begins on date Project is completed. Period shall be extended for defective Work that is corrected or removed and replaced.

B. Defects and damage due to animal depredation and weather extremes are excluded from warranty.

1.08 MAINTENANCE

A. Perform all maintenance for landscaping until Project is completed. For native plant seeding and plug work, perform initial part of approved 3-year Maintenance Instructions.

B. After Project is completed, Developer will perform maintenance procedures presented in approved Maintenance Instructions submitted by Contractor.

PART 2 - PRODUCTS

2.01 WATER

A. Free from impurities harmful to plants.

2.02 TOPSOIL

A. Site-salvaged humus-bearing soil or imported humus-bearing loam-type soil with a pH level between 6.0 and 7.0. Soil shall be free of roots, sticks, branches and stones greater than 1/2-inch diameter

2.03 SEEDING MATERIALS

A. Permanent turf grass seed: Deluxe 50 seed mix by Reinders, Inc., Waukesha, WI, Phone: 262-524-0200.

C. Temporary cover crop seed: Follow 31 25 00.

B. Nurse crop seed: Annual oats or annual ryegrass.

C. Turf grass seed fertilizer: 18-12-6 Starter Fertilizer - 25% PCSU (Polymer-Coated Sulfur-Coated Urea) - SGN (Size Guide Number) 215 and shall be applied in strict accordance with the manufacturer's written instructions.

D. Soil stabilizer: Land application. Follow Technical Standard 1050. Use PAL-listed product(s).

E. Erosion control mats. Follow 01 57 13.

2.04 SODDING MATERIALS

A. Sod:
1. Dense, well-rooted permanent and desirable grasses, weed free with lush appearance cut in uniform commercial strips. Thickness should be full and uniform, approximately 3/4-inch or more.
2. If sod is in dry condition before cutting, ensure that sufficient water is applied to sod 12 hours before cutting to provide a sod strip well moistened throughout cutting depth.

B. Sod fertilizer:
1. Granular or liquid, marked with content analysis.
2. 3-1-2 nitrogen-phosphorous-potassium ratio.
3. At least 50 percent of nitrogen content in organic, slow-release form.

C. Anchorage stakes at least 6 inches long.

2.05 NATIVE PLANT PLUG MATERIALS

A. Plant plugs: See Drawings for planting schedule and locations.
1. Size: Minimum 2-1/4 inches in diameter and 4-3/4 inches deep.
2. Root systems shall be well developed throughout the soil volume, but not overly root bound.
3. Plant tops should be adequately developed, viable, healthy, and sufficiently hardened for outdoor planting.

B. Starter mix backfill material: Compost, peat moss and topsoil at a ratio of two parts topsoil to one part compost/peat moss blend by volume.
   1. Compost: Follow DNR Specification S100.
   2. Peat moss: Brown to black color with at least 75-percent partially decomposed stems and leaves.

C. Fertilizer: None.

D. Mulch: Shredded hardwood bark from disease-free trees.

E. Staples: 6-inch U-shaped wire erosion control mat staples.

2.06 PLANTING MATERIALS

A. Use nursery-grown stock for trees, shrubs, and herbaceous plants. Refer to Appendix A for list of approved plantings. Deviation from the approved current tree list shall be reviewed and approved by the Director of Public Works or their Designee and Parks Director.
   1. Follow ANSI Z60.1.
   2. Hardy under climatic conditions similar to Project location.
   3. Typical of species or variety and have a normal habit of growth.
   4. Sound, healthy and vigorous, well branched and densely foliated when in leaf, and have healthy, well-formed tops and well-developed root systems.
   5. Free of disease, inspect pests, eggs or larvae.
   6. Grow container-grown stock long enough for root system to hold soil together, firm and whole. No plants shall be loose in container.
      a. If specified plant material is not obtainable within 150-mile distance, submit nonavailability list with proposal for equivalent material and impact on
      b. Measurement: Dimensions of trees and shrubs shall conform to ANSI Z60.1.
      c. Plants shall conform to measurements specified. Plants larger than specified may be used with Director of Public Works or their Designee approval and no increase Contract Price. For larger plants, increase root spread or soil ball in proportion to plant size.

B. Starter mix backfill material: Compost, peat moss and topsoil at ratio of two parts topsoil to one part compost/peat moss blend by volume.
   1. Compost: Follow DNR Specification S100.
   2. Peat moss: Brown to black color consisting of at least 75 percent partially decomposed stems and leaves.

C. Fertilizer: Granular or liquid 3-year slow release packets marked with content analysis.
   1. 10-15-10 nitrogen-phosphorous-potassium ratio for trees and shrubs, 5-10-10 for herbaceous plants.
   2. At least 50 percent of nitrogen content in organic, slow-release form.

D. Mulch: Shredded hardwood bark from disease-free trees.

E. Planting accessories:
   1. Staking: Provide stakes of solid durable wood approximately 2 by 2 inch, or steel, and of required length. Use good quality galvanized steel wire (11-12 gauge for trees 4 inch in diameter or less; 9-10 gauge for larger trees) and a suitable turnbuckle for adjusting wire tension. Wrap wire with 0.5-inch plastic hose at contact point with tree.

2. Tree wrappings: Use 2-ply waterproofed crepe tree wrapping paper, laminated with a layer of pliable asphaltic material.
3. Rodent protection: Metal commercial window screening material.
4. Anti-desiccant: Emulsion to create film on plant surfaces permeable enough to allow transpiration.

2.07 LANDSCAPING COMPONENTS

A. Herbicide: Short-duration 2 to 2-1/2 percent active ingredient glyphosate, Roundup.

B. Weed barrier: Equal to DeWitt's "Weed Barrier" (NEW PRO#5), black, woven plastic sheet.

C. Splash blocks: Precast formed concrete, minimum 18-inch length.

D. Edging:
1. Aluminum: minimum 4 inches high by 3/16 inch thick staked in place. Mill-finish natural aluminum, black.
2. Medium density polyethylene with UV inhibitors: 5 inches high and staked in place. Black.

E. Goose protection netting: Nylon mesh netting and steel fence posts. Minimum 3 feet above grade.

PART 3 - EXECUTION

3.01 TOPSOIL

A. Preparation:
1. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones more than 1/2-inch in size.
2. Scarify subgrade to 6 inches depth by ripping, tilling, disking, or other method where topsoil is scheduled and where equipment used for hauling and spreading topsoil has compacted subsoil.
3. Minimize compaction during grading operations by utilizing equipment having low unit pressure ground contact and by limiting repeat passes over the same areas in areas to receive topsoil.

B. Placement depths:
1. Turf grass seed and sod subgrade: 6 inches.
2. Planting beds: 12 inches.
3. Native seed and native plant plugs: 6 inches.

C. Installation:
1. Use topsoil in relatively dry state. Place during dry weather.
2. Fine grade topsoil eliminating rough or low areas. Break down clods and lumps with appropriate equipment that creates uniformly textured soil. Maintain levels, profiles, and contours of subgrade.
3. Remove stone, roots, and branches exceeding 3/4-inch sieve, and foreign material, and clods that cannot be broken down while spreading.
4. Manually spread topsoil uniformly around trees, plants, and buildings to prevent damage.
5. Lightly compact placed topsoil, to negate any detrimental differential settling.

D. Finish grade tolerance: Plus-or-minus 1/2-inch.

3.02 TURF GRASS SEEDING

A. Preparation:
1. Before seeding, disk, harrow, drag, and rake to form a level and loose seed bed. Lightly roll topsoil before final raking to eliminate soft spots and mounds.
2. Notify Director of Public Works or their Designee to allow inspection after fine grading and before seeding.

B. Permanent installation:
1. Broadcast seed uniformly by hand or with combination seeder-cultipacker machine such as Brillion or Truax. If by hand, press seed into surface with cultipacker or roller to maximum 1/4-inch depth. If seedbed contains clods or is too loose, lightly roll (not on slopes).
2. Sowing rate:
   a. Turf grass: 4.5 pounds per 1000 square feet. Double rate for dormant seeding.
   b. Temporary cover crop: Follow 31 25 00.
3. Uniformly apply fertilizer and lightly disc or harrow into soil in conjunction with final topsoil preparation, before seeding.
4. Fertilizer rate: 7 pounds per 1000 square feet.
5. Place erosion mats within 24 hours after completing seeding. Follow 31 25 00.
6. Protect seeded areas to prevent damage to completed installation.

C. Maintenance:
1. Water seeded areas as follows:
   a. First day (after seeding and fertilizing): 1-1/2 inches water.
   b. Days 2-14 (or until complete germination, whichever comes last): 1/2 inches water every other day.
   c. As needed after complete germination to maintain a uniform stand of healthy grass.
   d. Natural rain events may substitute for watering but perform additional watering on rain-event days to achieve stipulated water amounts.
2. Lawn areas shall receive at least two 2-inch mowing before acceptance. Do not allow grass height to exceed 4 inches.
3. Reseed areas that show inadequate catch and bare spots exceeding two square feet. Bare spots shall not exceed three percent of total seeded areas.
4. Correct damage from erosion, gullies, washouts, traffic, or other causes by filling with topsoil, tamping, fertilizing, and reseeding.
5. Protect grass areas during maintenance period.

3.03 NATIVE PLANT SEEDING

A. Preparation:
1. Do not seed until topsoil has been chemically treated to eliminate weeds. Follow Article 3.01.
2. Before seeding, till under any existing temporary cover crop to a minimum depth of 6 inches.
3. Disk, harrow, drag, and rake to form a level and loose seed bed. Lightly roll before final raking of topsoil to eliminate soft spots and mounds.
4. Notify Director of Public Works or their Designee to allow inspection after fine grading and before seeding.

B. Permanent installation:
1. Broadcast seed uniformly by hand or with combination seeder/cultipacker machine such as Brillion or Truax Trillion. If done by hand, press seed into surface using cultipacker or roller to maximum depth of 1/4 inch. If seedbed contains clods or is too loose, lightly roll.
2. Seed sowing rates:
a. Native plant seed: Follow manufacturer's recommendations.
b. Nurse crop:
1) Annual oats: 1.5 pounds per 1000 square feet if seeded before June 15. 3 pounds per 1000 square feet if seeded after September 15.
2) Annual ryegrass: 0.2 pounds per 1000 square feet if seeded before June 15. 0.6 pounds per 1000 square feet if seeded after September 15.
c. Temporary cover crop: Follow 01 57 13.l
d. Calibrate equipment used to deliver seed to specified seeding rates.
3. Fertilizer: None.
4. Place erosion mats within 24 hours after completing seeding. Follow 31 25 00.
5. Protect seeded areas to prevent damage to completed installation.

C. Maintenance:
1. For native plant seed placed before June 15, water as follows; natural rain events may substitute for watering, but perform additional watering on rain event days to achieve stipulated water amounts:
a. First day (after seeding and mulching): 1-1/2 inches water.
b. Days 2 - 45: 1/2-inch water every other day.
c. As needed after germination to maintain uniform stand of healthy vegetation.
2. Do not water native plant seed placed after September 15.
3. Achieve 90-percent vegetation with native species or nurse crop species, as verified by Director of Public Works or their Designee. At no time during maintenance period shall more than 10 percent of seeded area be dominated by weed species.
4. Reseed areas that show inadequate germination and bare spots exceeding 25 square feet. Bare spots shall not exceed 3 percent of total seeded areas.
5. Correct damage resulting from erosion, gullies, washouts, traffic, or other causes by filling with topsoil, tamping, refertilizing, and reseeding.
6. Chemically treat areas dominated by weed species at least two times before reseeding. Follow Article 3.01.
7. Protect seeded areas during maintenance period.

3.04 SODDING

A. Preparation:
1. Ensure area is free from stones, roots, and undesirable materials. Loosen soil to at least one inch deep.
2. Apply fertilizer uniformly over soil before sodding then work fertilizer into soil while preparing.

B. Installation:
1. Moisten earth bed to loosened depth if not already sufficiently moist. Place sod within 24 hours of being cut in strips of commercial size where possible (no pieces smaller than 18 by 24 inches). Stagger joints and place tightly against previously laid strip. Roll sod or lightly tamp with wooden or metal tampers.

2. Stake every 18 to 36 inches along length of strips on slopes steeper than 4H:1V and in drainage components. Stakes should hold sod firmly in place. Lay sod perpendicular to direction of slope so end joints alternate.
3. Clear excess soil from sod surface.
4. Repair and resod damage resulting from erosion, gullies, washouts or other causes.
5. Protect sodded areas during maintenance period. Maintain sodded areas by watering for at least 30 days to prevent drying and shrinking. Resod and maintain areas that dry out or fail to establish.

3.05 NATIVE PLANT PLUG INSTALLATION

A. Preparation:
   1. Before planting, till under any existing temporary cover crop to at least 6 inches deep.
   2. Disk, harrow, drag, and rake to form a level and loose seed bed. Lightly roll topsoil before final raking to eliminate soft spots and mounds.
   3. Notify Director of Public Works or their Designee to allow inspection after fine grading and before planting.

B. Installation:
   1. Install plugs in auger-drilled holes that are within plus 0.75 and minus 0.25 inches of plug diameter and depth.
   2. Space plant plugs one-foot apart.
   3. In wetland or shoreline areas with potential for high wave action, secure plugs in place with 8-inch U-shaped wire erosion control blanket staples.

C. Maintenance:
   1. Care for plants after planting. This includes watering, weeding, and other Work necessary to keep plants neat and healthy.
   2. Perform watering at 10 to 14-day intervals between May 15 and October 15. Intervals may lengthen or shorten depending upon weather conditions.
   3. At the end of the first full growing season after planting, at least 75 percent of individual plugs installed shall be present as live individuals and 75 percent of species installed shall be present and alive.
   4. Survival percentages shall be established by sampling of one square meter quadrants located at regular intervals along transects. The quantity of quadrants shall be as needed to represent 0.2 percent of the total planting area in each planting zone, and there shall be at least one randomly located transect in each planting zone.

3.06 TREE PLANTING

A. Terrace restrictions:
   1. Minimum horizontal separation of 10 feet from any underground utility.
   2. Minimum terrace width of 6 feet.
   3. Minimum horizontal separation of 10 feet from driveway openings.
   4. Minimum horizontal separation of 5 feet from carriage walks.
   5. Minimum horizontal separation of 30 feet from traffic control devices, street lights, and utility poles.
   6. Minimum horizontal separation of 10 feet from fire hydrants.
   7. Minimum horizontal separation of 40 feet from large trees, and 20 feet from low clearance trees.

8. Additional separation for tall trees.
9. Low clearance trees may be required in areas of overhead utility lines.
10. Existing damaged, or neglected, tree replacement shall be approved by the City.
11. Future street construction and site distance requirements shall be considered in terrace tree placement.
12. All tree placement shall be reviewed and approved by the Director of Public Works or their Designee, or City Arborist.

B. Parkway Width:
1. No trees will be planted where the grass terrace between the sidewalk and curb is less than 5 feet wide.

C. Planting Depth: The planting depth is determined by root collar. All new plantings should be placed so that the root collar is even with the soil surface or 1 to 2 inches above the surface.

D. Spacing: Depending on growth characteristics of species, trees will be planted thirty-five (35) to fifty (50) feet apart unless otherwise approved by the City Forester and UFC.

E. Transplanted Trees: When planting bare root trees, care must be taken to prevent unnecessary injury to roots. All damaged roots should be pruned.

F. Tree selection.
1. Select the right tree for the right place:
2. Carefully review all aspects of the site.
3. Closely review the soils ability of moisture to drain through the soil.
4. How much physical space is available above ground and below ground?
5. Don't plant a tree that will grow to a height of more than thirty (30) feet under power lines.
6. Consider environmental factors such as exposure to sunlight and road salt.
7. Choose tree species which match, or are adaptable to, growing conditions of the area.

G. Installation:
1. Excavate tree pit to minimum three times root ball diameter and at least the same depth or the full extent of the root system of bare root trees. Dispose of subsoil dug from plant pit.
2. Leave a pedestal in the center of the hole to rest the root system.
3. All banks of the hole shall be loosened by shovel and trees should be planted at their original soil level at the root collar.
4. Find the root collar and plant the tree even or 1 to 2 inches high. It is recommended to remove burlap and/or wire prior to planting.
5. Use good quality soil as backfill. Discard any rocks and debris from the soil before backfilling.
6. Water the soil with a garden hose. Do not pack the soil down manually; water will do this naturally. Fill in voids with more-soil after watering. New trees shall be watered as part of the planting process the day they are planted and then regularly for the first two years after planting, utilizing techniques such as hose, water spikes, watering bags, etc. The goal is to ensure that newly planted trees receive the equivalent of 1 inch of rainfall per week.
7. Create a 4" deep mulch bed using wood chips.
   a. Mulch should not touch the trunk directly to prevent mold and bacteria from forming. Apply heavier at edges to create a "saucer" effect. All newly

planted trees shall be wood chip mulched and protected with a minimum 12-*inch* plastic boot.

8. Staking: Stake trees 3-inch caliper or less. Provide wide belt-like material when supporting the tree to avoid injuring the bark, Trees need to move in the wind, so allow some "play" in the support system to allow the trunk to sway without being uprooted.
9. Prune any broken, dead or dying limbs without damaging the branch collar at the time of planting. Routine pruning should be started one year after planting. Do not use pruning paint or wound dressing on the pruning cuts.
10. Wait until one year after planting to fertilize.
11. Additional Care. Pruning, mulching and fertilizing should be provided as needed.

12. Prune each tree following ANSI Z60.1-1900 to retain required height and spread on Drawings. Remove dead wood or suckers and broken or badly bruised branches. Prune with clean sharp tools.
13. Wrap trees immediately after planting. Wrap trunks of trees spirally from ground to first branch and secure adequately without attaching directly to tree trunk or branches. Overlap wrap approximately 2 inches, make neat and snug. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before pruning.
14. Apply rodent protection material around tree trunks, with bottom of material resting on ground surface and top extending a minimum 4 feet above surrounding ground, or up to lowest branches on small trees. Wrap material loosely and attach to itself.
15. Place weed barrier fabric beneath mulch around individual trees in lawn areas. Lay fabric flat on soil and fit as close to tree trunks as possible. Overlap adjoining fabric sheets by 4 inches and secure to ground with metal pins.
16. After planting operations are completed, apply specified mulch to 4-inch depth. Spread evenly around base of individual trees in lawn areas.
17. After trees are in place for at least two but not longer than five days, remove twine, rope, and labels.

3.06 PLANTINGS

A. Installation:

1. Excavate plant pit to minimum two times root ball or container diameter. Dispose of subsoil dug from plant pit.
2. Remove containers or top 1/2 of burlap from balled and burlapped stock before planting. Check container plants for girdling roots before planting. Replace plant if girdling is evident.
3. Set plant stock on firm layer of undisturbed subsoil. Plumb and center in pit with top of root collar at or slightly above ground level. Place plant in pit with best side towards most prominent view.
4. Backfill pit with plant starter mix around base and sides of root ball or soil mass, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 1/2 full, water thoroughly before placing remainder of backfill. Once absorbed, complete backfilling with plant starter mix and tamp lightly to grade.
5. Add fertilizer packets to plant pit at rate following manufacturer’s recommendations before backfilling is complete. Place packets at least 6 inches below final grade of backfill material.

6. Prune each shrub following ANSI Z60.1-1900 to retain required height and spread on Drawings. Remove dead wood or suckers and broken or badly bruised branches. Prune with clean sharp tools.
7. Place weed barrier fabric beneath mulch in planting beds. Lay fabric flat on soil and fit as close to plants as possible. Overlap adjoining fabric sheets by 4 inches and secure to ground with metal pins.
8. After planting operations are completed, apply specified mulch to 4-inch depth (2 inches around herbaceous plants). Spread evenly over entire planting bed area.
9. After plantings are in place for at least two but not longer than five days, remove twine, rope, and labels.

B. Maintenance:
1. Care for plants after planting. This includes watering, weeding, cultivating, pruning, spraying for insects and disease, tightening stakes, retying wrapping, re-mulching, and other work necessary to keep plants neat and healthy.
2. Perform complete watering at 10 to 14-day intervals between May 15 and October 15. Intervals may lengthen or shorten depending upon weather conditions.

END OF SECTION

SECTION 33 05 00

COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Bedding, cover and backfill.

B. Location aids.

C. Insulation.

D. Polyethylene film wrap.

E. Connections between dissimilar pipes.

F. Excavation in pavement.

G. Excess excavated material.

H. Trench surface restoration.

1.02 RELATED SECTIONS

A. 01 43 26 – Testing and Inspecting Agency Qualifications.

B. 01 57 23 - Erosion and Sedimentation Control.

C. 31 11 00 – Clearing and Grubbing.

D. 32 90 00 - Restoration.

E. 33 11 00 - Water Utility Distribution Piping.

F. 33 30 00 - Sanitary Sewerage.

G. 33 40 00 - Storm Drainage.

H. 34 71 00 - Roadway Construction.

PART 2 - PRODUCTS

2.01 UTILITY PIPE AND APPURTENANCE MATERIALS

A. Water Utility Distribution Piping: Follow 33 11 00.

B. Sanitary Sewerage: Follow 33 30 00.

C. Storm Drainage: Follow 33 40 00.

2.02 BEDDING AND COVER MATERIALS

A. Crushed stone chips: Follow SWS 8.43.2(a).

B. Cover: Same material as bedding.

2.03 BACKFILL

A. Granular: Follow SWS 8.43.4.

B. Spoil: Follow SWS 8.43.5.

C. Flowable fill or aggregate slurry mix: Follow SWS 8.43.8.
1. 1,350 lbs. sand.
2. 750 lbs. 1 stone.
3. 1,150 lbs. 2 stone.
4. 25 gals. (0-0.5 gal.) water per cubic yard.
5. No additional water will be allowed. The above weights are damp weights.

2.04 LOCATION AIDS

A. Warning tape:
1. "Terra Tape Standard" by Reef Industries, Inc. or "Shieldtec" standard non-detectable tape by Empire Level Manufacturing Corporation.
2. Tape shall read:
   a. Water: "CAUTION WATER LINE BURIED BELOW".
   b. Sanitary: "CAUTION SEWER LINE BURIED BELOW".
   c. Storm: "CAUTION SEWER LINE BURIED BELOW".
   d. Non-potable water: "CAUTION RECLAIMED WATER - DO NOT DRINK".
3. Color: Follow State Statutes 182.0175 and American National Standards Institute (ANSI) Uniform Color Code:
   a. Water: Blue.
   b. Sanitary: Green.
   c. Storm: Green.
   d. Non-potable water: Purple.
4. Width: 3 inches.

B. Tracer wire:
1. Follow SWS 2.11.0.
2. For open-cut: Copper-Clad Steel (CCS) tracer wire insulated with a high-density polyethylene (HDPE) jacket.
3. Splices: Copperhead Drycon or City approved equal.
4. Color:
   a. Water: Blue.
   b. Sanitary: Green.
   c. Storm and storm manifold: Brown.
   d. Non-potable water: Purple.

C. Location boxes for tracer wire access.
1. Buried:
   a. SnakePit Access Point by Copperhead Industries.
   b. Cover: Marked "SEWER" or "WATER" to match buried pipeline. Two-terminal switchable lid.

c. Include hardwood blocking.

D. Ground rod for tracer wire.
1. Copperhead Industries.
2. Ground rod with 12-AWG wire (ANO-12).

2.05 SURFACE RESTORATION

A. Pavement: Follow 34 71 00.

B. Lawn: Follow 32 90 00.

C. Curb and gutter: Follow 34 71 00.

D. Concrete sidewalk: Follow 34 71 00.

E. Temporary seeding: Follow 01 57 13.

2.06 INSULATION

A. Follow SWS 8.50.0.

2.07 POLYETHYLENE FILM WRAP

A. Follow SWS 8.21.0.

PART 3 - EXECUTION

3.01 CONNECTING DISSIMILAR PIPE MATERIALS

A. Follow pipe manufacturers' recommendations and design details.

3.02 EXCAVATION IN PAVEMENT

A. Pavement sawing: Initially saw concrete or asphalt pavements or concrete bases at least 3 inches deep before shattering. Saw, cut with spades, or use another approved method before removing pavement.

B. Sealed surface pavement: Cut evenly along excavation edges before removal to avoid excess removal or ragged, uneven edges.

C. Utility trench cut locations: Follow SWS File No. 1 Drawing.

D. Bridging: Furnish and install trench bridging over open trenches crossing roadways when requested by Director of Public Works or their Designee. Use steel plates, composite timber construction, or prefabricated structural steel members. Do not fabricate structural steel bridging on job Site. Design to support HS-20-wheel loading. Secure installed bridging against shifting. Do not leave bridging in roadway during winter months without Director of Public Works' or their Designee's approval.

3.03 UTILITY PIPE AND APPURTENANCE INSTALLATION

A. Water Utility Distribution Piping: Follow 33 11 00.

B. Sanitary Sewerage: Follow 33 30 00.

C. Storm Drainage: Follow 33 40 00.

3.04 POLYETHYLENE FILM WRAP

A. Follow SWS 4.4.4.

B. All ductile iron or cast iron.
1. Mains.
2. Laterals.
3. Fittings.

3.05 LOCATION AIDS

A. Warning tape: Place 12 inches below finished grade for:
1. All water mains and services.
2. All storm sewers, sump lines, and laterals. No tape for sump manifold pipe.

B. Tracer wire:
1. Attach with tape every ten (10) feet to:
   a. All water mains and services.
   b. All storm sewers, sump lines, sump manifold pipe, and laterals.
2. Do not splice between location boxes without Director of Public Works' or their Designee's approval except at laterals and services.

C. Install location boxes at:
1. Water mains and services.
   a. Behind every hydrant.
   b. At each curb stop and at a maximum spacing of 500 feet.
2. Sewers, laterals, and sump lines.
   a. 600 feet maximum intervals.
   b. Sanitary, storm wires can be placed in same location box.
   c. For manifold pipe place near cleanout at upstream end and just outside curb inlet at downstream end.

D. Install ground rods at:
1. Water services.
   a. At each curb stop locator box.
1. Hydrants.
   a. At each hydrant locator box.

E. Demonstrate continuity of tracer wires to Director of Public Works or their Designee and Water Utility Supervisor. Provide a temporary above-ground wire between adjacent location boxes. Connect ohm meter in a series loop with tracer wire and above-ground wire. Circuit resistance shall not exceed 5 ohms.

F. Test locating. Contact Director of Public Works at (920) 397-9909 to locate all storm and sanitary utilities. Contact Water Utility Supervisor at (920) 397-9916 to locate all water mains.
1. After completion of continuity test.
2. Before acceptance for use.
3. Before asphalt paving.

3.06 EXCAVATED MATERIAL

A. Remove surplus excavated material from Site. Surplus excavated material for which Owner does not designate a disposal site shall be disposed at Contractor's cost. Follow submittal requirements for each disposal site utilized. After delivery to the designated location, such material shall be graded level by Contractor.

3.07 INSULATION

A. Follow SWS 4.17.2 and SWS Drawing File No. 48 when requested by Director of Public Works or their Designee or when depth of cover is less than 4-1/2 feet over sanitary sewer, water main, and force main.

3.08 BEDDING AND COVER

A. Follow SWS 3.2.6(b) Class B. Sanitary sewer and water main.

B. Follow SWS 3.2.6(a) Class C. Storm sewer.

3.09 TRENCH BACKFILLING AND CONSOLIDATION

A. Material:
1. For new construction: from 5 feet behind existing back-of-curb or edge-of-pavement to and including paved areas and driveways; and to within 15 inches of the finished pavement elevation:
   a. Granular. Follow 34 71 00.
   b. Remaining 15 inches shall be 1-1/4 inches crushed limestone. Follow 34 71 00.
2. For existing roadways: from 5 feet behind existing back-of-curb or edge of pavement to and including paved areas and driveways; and within 15 inches of the finished pavement elevation:
   a. Flowable fill or aggregagte slurry mix. Follow SWS 8.43.8.
   b. Unless a full roadway reconstruct is specified; then granular backfill, approved by the Director of Public Works or their Designee, and compacted to 95% of a modified proctor is acceptable.
   c. Remaining 15 inches shall be 1-1/4 inches crushed limestone. Follow 34 71 00.
3. Other areas: Spoil.
4. Around and over Underground Facilities: Follow respective owner's requirements.

B. Consolidation:
1. Mechanically compact trench backfill. Follow SWS 2.6.14(b) except Contractor shall furnish and pay for compaction testing services that follow 01 43 26.

2. Trench compaction testing frequency: 1 test per 100 linear feet, per fill layer, per street until acceptable process for achieving consistent passing test results is established.

3.10 SURFACE RESTORATION

A. Pavement: Follow 34 71 00.

B. Lawn: Follow 32 90 00.

C. Curb and gutter: Follow 34 71 00.

D. Concrete sidewalk: Follow 34 71 00.

E. Temporary seeding: Follow 01 57 13.

3.11 CLEARING AND GRUBBING

A. Follow 31 11 00. Cleanly prune damaged trees.

3.12 CLEANUP

A. Clean dirt and construction material from haul roads:
1. At end of each working day.
2. As needed during the day to avoid creating hazards or complaints.
3. As requested by Owner.

END OF SECTION

SECTION 33 11 00

WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Water mains, control, and distribution appurtenances.

1.02 RELATED SECTIONS

A. 33 05 00 - Common Work Results for Utilities.

1.03 REFERENCES

A. Wisconsin Administrative Code Chapters:
1. NR 105 - Surface Water Quality Criteria and Secondary Values for Toxic Substances.
2. NR 106 - Procedures for Calculating Water Quality Based Effluent Limitations for Point Source Discharges to Surface Waters.

B. ASTM International.
1. ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections.
2. ASTM C858 Standard Specification for Underground Precast Concrete Utility Structures.
3. ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures.
4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

C. American Water Works Association (AWWA):
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
3. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
4. AWWA C151 - Ductile-Iron Pipe Centrifugally Cast.
5. AWWA C502 - Dry Barrel Fire Hydrants.
6. AWWA C504 - Rubber Seated Butterfly Valves.
7. AWWA C509 - Resilient Seated Gate Valves for Water Supply Service.
8. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.
9. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 4 In. Through 12 In. for Water Distribution.
10. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In.

PART 2 - PRODUCTS

2.01 LEAD REDUCTION

A. Products and parts thereof with wetted surfaces in contact with drinking water shall meet or exceed the requirements of Public Law 111-380-Reduction of Lead in Drinking Water Act, which is an amendment to the Safe Drinking Water Act. Brass castings shall be visibly stamped or labeled as “NL”.

B. Brass alloy used for water system castings shall have a zinc content that is below 15%. Brass castings that are visibly stamped or labeled as “NL-A” shall not be used and will be rejected.

2.02 MANUFACTURER

A. All components shall be manufactured in the U.S.A.

2.03 WATER MAIN PIPE AND APPURTENANCES

A. Pipe, 3-inch and larger. Provide one type from following:
   1. PVC:
      a. For 4 through 12-inch diameter: Follow AWWA C900, CIOD Class 235 pressure pipe with DR 18 or less.
      b. For 14 through 48-inch diameter: Follow AWWA C905, CIOD Class 235 pressure pipe with DR 18 or less.
      c. Integral elastomeric bell and spigot joints.
      d. Follow SWS 8.20.0.

B. Resilient wedge valves (16-inches or less):
   1. Follow AWWA C515 including:
      a. Nonrising stem.
      b. Mechanical joint.
      c. Actuator: 2-inch square wrench nut.
      d. Opens counterclockwise.
      e. Stem seals: O-ring.
      f. Epoxy interior and exterior coating following ANSI/AWWA C550.
      g. Stainless steel bolts.
      h. Follow SWS 8.27.0.
   2. Mueller Company.
   3. American Flow Control Series 2500 (formerly Waterous).

C. Butterfly valves (larger than 16-inches):
   1. Conform applicability with Director of Public Works or their Designee.
   2. Follow AWWA C504 and SWS 8.28.0 including:
      a. Nonrising stem.
      b. Mechanical joint.
      c. Actuator: 2-inch square wrench nut.
      d. Opens counterclockwise.
      e. Stem seals: O-ring.
      f. Epoxy interior and exterior coating following ANSI/AWWA C550.
      g. Stainless steel bolts.
   2. M&H (450)
   3. Pratt (Groundhog HP250).
   4. Clow (2810-F5365).

D. Valve enclosures:
   1. Boxes:
      a. Cast iron assembly, size DD, cover marked "WATER".
      b. Manufacturers: Tyler Union, Series 6860, 3-Piece, Screw Type.
      c. Extension sections for valves greater than 8 feet.
      d. Follow SWS 8.29.0.
      e. Valve box adapters: Adaptor, Inc. or approved equal.

E. Valve stem extenders:

1. For valve depth greater than 8 feet.
2. Securely attached to valve operator.
3. Extend to within 4 - 6 feet below finished grade.
4. For 6 feet and longer provide one-piece, solid shaft.
5. Stainless steel or epoxy-coated iron with stainless steel pins or bolts.
6. Spacer ring at 3 inches below operating nut. Stainless steel pins or bolts.

F. Hydrant assembly.
1. Follow AWWA C502 and SWS 8.26.0:
   a. Bury depth: 7'-0" minimum.
   b. Opens clockwise.
   c. Break-flange.
   d. 5-1/4-inch minimum main valve opening, Two (2) National Standard 2-1/2-inch hose nozzles.
   e. Painted factory yellow.
   f. Mechanical joint connection.
   g. Barrel extensions: Same manufacturer as hydrants. One (1) per hydrant.
   h. Compact fittings in accordance with C153 are acceptable.
   i. Manufactured within 24 months of construction and stored properly.
2. Mueller Centurion A423.
3. Hydrant lead:
   a. PVC: Same as main.
4. Marker Flag:
   a. 5 feet long.
   b. Fiberglass, alternating red and white with reflectorized coloring.
   c. Spring load action.

G. Fittings: Follow SWS 8.22.0.:
1. Joints:
   a. Buried: Mechanical.
2. Pressure rating:
   a. Full body: 250 PSI.
   b. Compact: 350 PSI.
3. Material:
   a. Ductile iron:
      1) Class 52 wall thickness.
      2) Bituminous exterior coating following ANSI/AWWA C110/A21.10.
      3) Cement lined and bituminous coated interior following ANSI/AWWA C104/A21.4.
      4) Cor-Blue tee bolts.

H. Service lines, valves, and fittings.
1. Lines:
   a. 2-inch and smaller shall follow SWS 8.24.0 and:
      1) Polyethylene (HDPE) SDR 9 CTS, conforming to ASTM D2743, AWWA C901 and shall have NSF 14 certification. For new services and reconnections when existing is polyethylene.
      2) Type K copper tubing. For reconnections when existing is copper tubing.
2. Corporation valves for HDPE:
   a. Must withstand 150 PSI pressure test.
   b. Use compression fittings with stainless steel stiffeners.
   c. Mueller B-25008N.
   d. Ford FB1001.
3. Corporation valves for copper:

a. Must withstand 150 PSI pressure test.
b. Compression fittings: Mueller B-25008N.

4. Curb valves for HDPE:
   a. Must withstand 150 PSI pressure test.
   b. Use compression fittings with stainless steel stiffeners.
   c. (3/4-inch and 1-inch): Mueller H-15155 or Ford B44-M.
   d. (1 ½-inch and 2-inch): Mueller B-25155 or Ford B44-M.
5. Curb valves for copper:
   a. Must withstand 150 PSI pressure test.
   b. Compression fittings: Mueller H-15155.
6. Curb boxes:
   a. Screw-on style. Minneapolis pattern with pentagon lid.
   b. Mueller H-10300 with four (4) foot stationary rod and guide ring. Stainless steel bolts.
7. Teflon tape on threaded joints.
8. Valve stem extension.

I. PVC main tapping saddle for service lines 2-inch and smaller:
1. Double strap.
2. Ford FS202 or Smith-Blair 372.

J. Tapping sleeves with gate valve 24-inch and under:
1. All stainless steel.
2. Smith-Blair 663.
3. Ford Fast-Tap.

K. Buttress concrete: Class F following SWS 8.35.3. Use one of the following:
1. Ready-mixed.

L. Restrained joints:
1. EBAA Iron MEGALUG corresponding to pipe material.

M. Combination air valve.
1. Val-Matic Combination Clean Water Valve, model 202C.2
2. 2-Inch NPT, single body type.
3. Shut off valve.

2.04 INCIDENTAL CONSTRUCTION

A. Follow 33 05 00 for:
1. Bedding.
2. Cover.
3. Backfill.
4. Location aids.
5. Trenchless utilities.
6. Insulation.
7. Polyethylene film.
8. Surface restoration.

PART 3 - EXECUTION

3.01 WATER MAIN INSTALLATION

A. Follow SWS Part IV.

B. For ductile iron, provide electric continuity using strapping or metallic retainer glands.

C. PVC pipe:
1. Remove beveled pipe end at connections to mechanical joint or flanged fittings.
2. Use tapping saddles for services.
3. Demonstrate continuity of tracer wires in accordance with 33 05 00.
4. Minimum depth of cover from finish grade to the top of the main pipe shall be six and one half (6.5) feet.
5. No water main shall be installed with cover depths greater than eight (8) feet unless approved by the Director of Public Works or their Designee.
6. No water main shall be laid through any trench having cinders, rubbish, rock, or any other material which may cause injury or disintegration of the pipe.

D. Valves:
1. Set valve boxes 3/8-inch to 1/2-inch below asphaltic binder course upon initial installation.
2. One riser ring shall be utilized to make the final adjustments to 1/4-inch to 3/8-inch below surface elevation only when approved by Water Utility Supervisor.
   a. Final adjustment of valve boxes shall be completed in presence of Water Utility Supervisor prior to surface course paving. Provide Water Utility Supervisor minimum of 24-hour notice.
3. Valve boxes shall not be asphalt ramped.
4. Provide poly-wrap valve and valve box extending to 6 inches above asphalt binder course.

E. Hydrants:
1. Locate hydrant valve 2 feet from curb flag or as directed by City of Fort Atkinson Water Department.
2. Provide minimum 6 feet cover over lead.
3. Provide EBAA Iron MEGALUG at hydrant valve and at the hydrant.
4. One (1) continuous length of pipe shall be used between hydrant and valve. If length between valve and hydrant is greater than 20 feet, all joints shall be restrained in manner approved by the City of Fort Atkinson Water Department.
5. Position centerline of lowest hydrant outlet nozzle 18 to 21 inches above finish grade.
6. Barrels shall be polyethylene wrapped with tape.
7. Shall be located a minimum distance away from building of 1.5 times the height of nearest building wall.
8. Shall be located 350 feet apart (residential districts) and 300 feet apart in (commercial, industrial and multi-family districts) or other approved distances by the Utility.
9. Locate a minimum horizontal distance of 10 feet from all driveway approaches and streetlights, utility poles, and pedestals.
10. Shall be located 3 feet behind back of curb,
11. If hydrant shoe is below water table, provide hydrant with plugged weep holes and mark with City approved identifying disks.
12. Hydrants shall be supported upon a precast concrete or hardwood block.
13. Each hydrant shall be braced against the far end of the trench by a poured in place concrete buttress. Do not block/cover weep hole.
14. Where a hydrant is set in soil that allows drainage, drainage shall be provided at the bases of the hydrant by placing crushed stone from the bottom of the trench to at least 6 inches above waste opening in the hydrant and to a distance of 1 foot around the base elbow.
15. Hydrants set in clay, rock, or other impervious soil, shall have a drainage pit 2 feet in diameter and 3 feet deep excavated below the hydrant base and filled with compacted crushed stone.

a. Stone shall be placed under and around the elbow and concrete base to a level of 6 inches above the waste opening. No drainage system shall be connected to a sanitary sewer.

F. Buttresses: Follow SWS 4.3.13.

G. Services:
1. Wet tap service connections at normal operating system pressure.
2. No service laterals laid through any trench having cinders, rubbish, rock, or any other material, which may cause damage to or premature failure of the service pipe.
   a. Adequate means of protection shall be provided by backfilling with sand, or other material insulation, to be approved by the City.
3. Service pipes passing through curb or retaining walls shall be adequately safeguarded. Adequate channel space, or pipe casing, not less than two times the diameter of the service connection.
   a. Space between the service pipe and channel, or pipe casing, shall be filled and lightly caulked with, mastic cement, or other resilient material.
4. For 2 inches and smaller follow SWS Part V and:
   a. Provide curb valve and box at existing curb box location. Shown on Drawings.
5. Services shall be installed a minimum of ten (10) feet from existing or future driveway locations.
6. New services shall extend a minimum of six (6) feet beyond right of way line with a whip tail from the curb stop shutoff.
7. Water services are to be centered on the lot (within five (5) feet of center).
8. Services shall be staked prior to construction.
9. Provide a two (2) by six (6) inch hardwood marker at end of service from invert of service to two (2) feet above finished grade.
10. Unused water services shall have the corporation stop turned off and the service (and all appurtenances) removed to the corporation stop.
11. Test services following SWS 5.5.18.

H. Pressure test before services 2 inches and smaller are installed. Follow SWS 4.15.0.
1. A City Representative must always be present during the testing process.
2. Contractor has the option to test the entire new water main as one continuous test section or in segments per his discretion.
3. Contractor shall furnish all labor, equipment, and material to complete all testing.

I. Disinfect pipelines following SWS 4.3.12 and 4.16.0.
1. Contractor shall furnish, and bond, chlorine tablets at the top of each pipe, on the spigot end, as it is placed.
2. Pipe installed outside of the water main segments shall be disinfected by swabbing with a five (5)% hypochlorite solution and thoroughly flushed. The entire interior surfaces of all pipes and fittings shall be thoroughly swabbed.
3. Contractor shall use extreme care to ensure the cleanliness of all water main materials.
4. Contactor shall be responsible for the cost of sterilization work, including re-chlorination if necessary, flushing, sampling, and processing of bacteriological samples.

J. Flushing/filling of water main.
1. Water for testing/flushing of mains shall be made available by the City of Fort Atkinson Water Utility subject to its requirements and charges.
2. Contractor shall notify the City/Utility of flushing/filling schedule and obtain a meter to be used.
3. All flushing/filling of new mains shall be completed by Contractor.

K. After successful pressure test, bacteriological water sampling, and laboratory testing shall be done following SWS 4.16.0 by: Contractor with Wisconsin DNR-certified independent laboratory.
   1. A safe water sample shall be obtained from each of the segments hydrostatically tested. Contractor shall collect two water samples for testing, 24 hours apart, the result in safe bacteriological laboratory testing.
   2. Samples shall be taken from connection to intersecting mains.
   3. Samples must be proven by a Wisconsin DNR-certified independent laboratory.
   3. The City of Fort Atkinson Utility shall receive a copy of the bacteriological test results prior to placing water main in service.
   4. Unsatisfactory test results: failed segments of water main shall be sterilized by the Contractor and samples taken until 2 consecutive passing results are obtained within a 24-hour period.

L. Water wasted from pipeline and/or tower that may reach bodies of surface water may not contain any substances in concentrations that adversely affect the water following Wisconsin Administrative Code NR 105 and 106. For chlorine, no total residual chlorine may be measured in water being discharged to a surface water. Advise Utility of proposed discharge schedule to arrange DNR-required measurements. Contractor shall provide and operate a “de-chlorination” unit for this project when flushing of main is taking place.

M. Connections to existing mains and services: Make after all services are installed, tests passed, and safe sample report is received by Owner.

N. Restrained joints: Follow manufacturer's recommendations for length of pipe to be restrained in each direction from horizontal bends, vertical bends or offsets, tees, reducers, and dead ends.

O. Combination air valve.
   1. Install per manufacturer’s instruction.

3.02 INCIDENTAL CONSTRUCTION

A. Follow 33 05 00 for:
   1. Connecting dissimilar pipe materials.
   2. Excavation in pavement.
   3. Bedding.
   4. Cover.
   5. Backfill.
   6. Location aids.
   7. Insulation.
   8. Polyethylene film.
   9. Excess excavated material.
   10. Surface restoration.

3.03 WATER MAIN ABANDONMENT

A. Water Main
   1. Description: Abandon and plug a segment of existing water main by “cutting it off” from the active water system. The work also includes securely capping or plugging the cut end of the active main.
   2. Materials: See Part 2.
   3. Construction:
      a. Prior to proceeding with the cut-off, perform the required water main shut-off notifications.
      b. When authorized to proceed, isolate, and shut-off the existing water main.
      c. Cut of the water main at the location designated for abandonment.
      d. Install a concrete pipe plug or restrained plug in the end of the existing main which is to be abandoned.
      e. On the end of the water main which is to remain in-service: Install a restrained mechanical joint cap over the cut end of the existing water main, or within 2 feet of a fitting or live-tap. Otherwise, install a restrained mechanical joint plug fitting into a new or existing fitting located at the end of the main.
      f. If the water main cut off work is intended to remove and replace an existing fitting, valve, or segment of pipe, cut off as designated, remove the existing material, and replace it with the new fittings and/or the lengths of pipe and solid sleeves necessary to reconnect to the existing main.
      g. Disinfect any associated materials by swabbing methods in accordance with Water Utility.

B. Valve Box
   1. Description: Abandon valve boxes within the project limits that are set upon valves no longer in service. Place the abandoned valve in the closed position prior to abandoning the box. Completely remove the valve box whenever possible.
   2. Materials: See Part 2.
   3. Construction:
      a. Proceed with work only after the existing water main has been abandoned.
      b. Remove the top casting of the valve box to a point at least 3 feet below the final elevation, and then backfill the opening.

C. Hydrant
   1. Description: Abandon fire hydrants within the project limits that are no longer in service.
   2. Materials: See Part 2.
   3. Construction:
      a. Proceed with work only after the existing water main has been abandoned.
      b. Excavate to the bottom of the hydrant and disassemble from the hydrant lead.
      c. Remove the hydrant. Salvage all hydrants and deliver to Water Utility.
      d. Backfill the opening with existing material and compact.

END OF SECTION

3.03 WATER MAIN ABANDONMENT

A. Water Main
1. Description: Abandon and plug a segment of existing water main by "cutting it off" from the active water system. The work also includes securely capping or plugging the cut end of the active main.
2. Materials: See Part 2.
3. Construction:
   a. Prior to proceeding with the cut-off, perform the required water main shut-off notifications.
   b. When authorized to proceed, isolate, and shut-off the existing water main.
   c. Cut of the water main at the location designated for abandonment.
   d. Install a concrete pipe plug or restrained plug in the end of the existing main which is to be abandoned.
   e. On the end of the water main which is to remain in-service: Install a restrained mechanical joint cap over the cut end of the existing water main, or within 2 feet of a fitting or live-tap. Otherwise, install a restrained mechanical joint plug fitting into a new or existing fitting located at the end of the main.
   f. If the water main cut off work is intended to remove and replace an existing fitting, valve, or segment of pipe, cut off as designated, remove the existing material, and replace it with the new fittings and/or the lengths of pipe and solid sleeves necessary to reconnect to the existing main.
   g. Disinfect any associated materials by swabbing methods in accordance with Water Utility.

B. Valve Box
1. Description: Abandon valve boxes within the project limits that are set upon valves no longer in service. Place the abandoned valve in the closed position prior to abandoning the box. Completely remove the valve box whenever possible.
2. Materials: See Part 2.
3. Construction:
   a. Proceed with work only after the existing water main has been abandoned.
   b. Remove the top casting of the valve box to a point at least 3 feet below the final elevation, and then backfill the opening.

C. Hydrant
1. Description: Abandon fire hydrants within the project limits that are no longer in service.
2. Materials: See Part 2.
3. Construction:
   a. Proceed with work only after the existing water main has been abandoned.
   b. Excavate to the bottom of the hydrant and disassemble from the hydrant lead.
   c. Remove the hydrant. Salvage all hydrants and deliver to Water Utility.
   d. Backfill the opening with existing material and compact.

END OF SECTION

SECTION 33 30 00

SANITARY SEWERAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewer mains, force mains and maintenance and collection appurtenances.

1.02 RELATED SECTIONS

A. 33 05 00 - Common Work Results for Utilities.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
2. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
3. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).
6. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
7. ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.
8. ASTM D2657 - Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
9. ASTM D3034 - Standard Specification for Type PSM Poly(VinylChloride) (PVC) Sewer Pipe and Fittings.
10. ASTM D3251 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
11. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
12. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.

B. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO M198 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
2. AASHTO T99 - Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.

C. United States Department of the Interior-Bureau of Reclamation. Standard Specifications for Reinforced Concrete Pressure Pipe.

D. American Water Works Association (AWWA):
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
3. AWWA C151 - Ductile-Iron Pipe Centrifugally Cast.
4. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 4 In. Through 12 In. for Water Distribution.
5. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In.

E. City of Fort Atkinson Standard Construction Specifications dated October 2020.

PART 2 - PRODUCTS

2.01 GRAVITY SANITARY SEWER

A. Pipe. If not shown on Drawings, use one type from following:
1. Polyvinyl chloride and fittings solid wall:
a. 4 through 15 inches: Type PSM, Follow ASTM D3034, SDR 35.
b. 18 through 27-inches: Type PSM. Follow ASTM F-679
c. Follow SWS 8.3.0 and 8.10.0.
d. Integral bell type flexible elastomeric joints.

B. Bulkhead and Plug: Follow SWS 3.2.25.

C. Structures:
1. Manholes:
a. Follow SWS 3.5.0. and SWS 8.39.0.
b. Follow ASTM C478.
c. If not shown on Drawings: 48-inch inside diameter (minimum) with eccentric cones.
2. Steps:
a. Follow SWS 3.5.4.(g).
b. Do not locate over pipe penetrating manhole wall. Follow SWS Drawing File No. 13.
3. Frame: Follow SWS Drawing File No. 14A approximate weight 385 pounds.
a. Neenah R-1550.
4. Cover: Type “B” self-sealing, concealed pick hole, no vents.
5. Manhole frame/chimney rubber seal shall follow ASTM C923 and one of the following (not required with Cretex Pro-Ring grade adjusters) :
a. Internal/External Adaptor Seal by Adaptor, Inc.
b. Cretex External X-85.
c. Bands for sealing the sleeve against the manhole shall be fabricated of stainless-steel conforming to ASTM W240, Type 304. Screws, bolts, and nuts used on the band shall be stainless steel conforming to ASTM F593 and F594, Type 304.
d. All materials shall be installed per the manufacturer’s instructions and tested per SWS 3.5.4(1)(a).
6. Pipe to manhole connection: Follow SWS 3.5.7.
a. Flexible watertight pipe to manhole seal conforming to ASTM C923.
b. Kor-N-Seal or approved equal.

7. Frame and chimney sealants: No adhesive between frame and Cretex grade adjuster.
8. Flat decks - HS20 loading.
9. Grade adjusters for castings:
    a. Cretex Pro-Ring. Interior and exterior dimension of ring shall match top dimensions of the manhole cone section.
    b. Do not use bricks, stones, wood, or pieces thereof.
10. External joint wrap:
    a. Mac Wrap (Mar Mac Construction Products Inc.).
    b. Esky-Wrap.
    c. Cadilloc External Pipe Joint (U.P. Peninsula Rubber Company, Inc.).

D. Control (Sampling/Gauging) Manholes
1. Follow SWS 3.5.8(e) for gauging manholes.
2. Follow SWS 3.5.8(f) for sampling manholes.

E. Risers:
1. Follow SWS 3.2.26. Precast concrete.

F. Laterals:
1. Follow SWS 5.3.10 and SWS 5.3.11 and same material as main.
2. 6 inches.
3. Connection to new main: Wyes.
4. Connection to existing main: Inserta Tee.

2.02 FORCE MAIN AND PRESSURE SEWER

A. Coordinate with Director of Public Works or their Designee to determine approved products.

2.03 INCIDENTAL CONSTRUCTION

A. Follow 33 05 00 for:
1. Bedding.
2. Cover.
3. Backfill.
4. Location aids.
5. Trenchless utilities.
6. Insulation.
7. Polyethylene film.
8. Surface restoration.

PART 3 - EXECUTION

3.01 GRAVITY SANITARY SEWER INSTALLATION

A. Before starting, bulkhead and/or plug the connection to existing sewer. Leave in place until new sewer has been cleaned and accepted.

B. Follow SWS Part III.

C. Connections to existing sewers and/or manholes.
   1. Contractor shall make connection to existing sewers, force mains, and/or manholes as shown on the approved plans, in conformance with SWS 3.2.27.
   2. Contractor shall verify alignment, and grade, of existing sewers in existing manholes, and replace, or restore, flow line bench, as necessary.
   3. Connections to existing manholes shall be made in accordance with SWS 3.5.7.
      a. Field tapped holes for manhole connections shall be made by coring the manhole except connections to brick or block manholes may be made by punching out the opening. Mortar annular space between all pipes and manhole cores.
      b. Provide flexible watertight connectors in accordance with manufacturer's written instruction.

D. Set manhole frames initially to 3/8-inch to 1/2-inch below binder pavement. Adjust final rim grade to within 3/8-inch to 1/2-inch below the finish grade after completion of curb and gutter and before asphalt placement. Adjust rim with Cretex Pro-Ring grade adjusters.
   1. Final adjustment of manhole frames shall be completed in presence of Director of Public Works or their Designee prior to surface course paving. Provide Public Works Director minimum of 24-hour notice.

E. Control Manhole: Required for industrial buildings, select commercial, or as directed by Director of Public Works or their Designee.

F. Chimney:
   1. Height: Minimum 6 inches to maximum of 15 inches of grade adjusters.
   2. Top-frame to top-of-first-step: Maximum 31 inches.
   3. No steps in chimney.

G. Laterals. Follow SWS Part V and:
   1. 1/4-inch per foot minimum slope.
   2. Lateral locations on Drawings are tentative.
   3. Laterals shall be placed a minimum of 10 feet from an existing or proposed driveway location.
   4. Contractor shall furnish and install a marker board over the end of each lateral installed.
      a. Marker shall be a minimum of 2"x6"x12' hardwood plank, painted green,
      b. Marker shall extend a minimum of 3 feet above finish grade and to bottom of service.
   5. No laterals may be connected at or within 5 feet of a manhole.
   6. Laterals connected to in manholes via horizontal directional drilling shall be subject to requirements of visible beam lamping to identify uniformity of bore and must be air tested.
      a. Provide test tee at end of lateral.
   7. Sanitary laterals shall have a maximum depth of 13 feet at the property line, while still providing basement drainage.
   8. Unused laterals shall be eliminated by cured-in place liner, and/or capped and grouted solid at the mainline sewer.

H. Air test: Follow SWS 3.7.3.

I. Go-No-Go Test: Follow SWS 3.2.6(i)4.

J. Manhole chimney seals:
1. Prepare chimney, cone, mortar, and frame following seal manufacturer's requirements.
2. Install seals following AASHTO M198 for type B butyl rubber caulk.
3. Install FlexRib Seals with hydraulic installation tool.
4. Test all seals in Director of Public Works' or their Designee's presence following SWS 3.5.4(f)1.a.
5. Extend internal manhole seals from manhole frame to manhole corbel.

K. Use external joint wrap on all manhole joints.

L. Sanitary sewer televising:
1. All newly installed sanitary sewers, including point repairs, shall be televised prior to acceptance.
2. Follow SWS 7.1.2.
3. Televising to be performed after manhole and pipe installation is complete, including backfill and testing, but before paving.
4. Contractor shall ensure all lines are flushed and clean prior to televising.
5. Sewer spans not accepted shall be re-cleaned and re-televised.
6. Cost of cleaning and video recording shall be the responsibility of the Contractor.
7. Contractor shall install sewer plug, or bulkhead, in downstream manhole and shall remain in place throughout the cleaning and televising process, and until final acceptance by the City.
8. Televising shall only be performed by The City of Fort Atkinson Staff, or The Expediters, Inc., 400 N. Summit Drive, Oconomowoc, WI 53066. (800) 657-0879.

3.02 FORCE MAIN AND PRESSURE SEWER INSTALLATION

A. Coordinate with Director of Public Works or their Designee.

3.03 INCIDENTAL CONSTRUCTION

A. Follow 33 05 00 for:
1. Connecting dissimilar pipe materials.
2. Excavation in pavement.
3. Bedding.
4. Cover.
5. Backfill.
6. Location aids.
7. Insulation.
8. Polyethylene film.
9. Excess excavated material.
10. Surface Restoration.

3.04 SANITARY SEWER ABANDONMENT

A. Sewer main 15" diameter or larger that have not been removed.
1. Description: Abandon and plug a segment of existing sanitary sewer main by bulkheading and filling with cellular concrete.
2. Materials:

a. Bulkhead: Brick or concrete masonry, or any Director of Public Works or their Designee approved commercial grade concrete.
b. Cellular concrete: Follow SWS 8.35.5 with minimum 500 psi compressive strength.

3. Construction:
a. Do not proceed until ordered by Director of Public Works or their Designee.
b. Abandon sewer at locations designated in the plan or as directed by Director of Public Works or their Designee.
c. Bulkhead and fill the abandoned sewer pipe with cellular concrete.
d. If the sewer cannot be filled from existing manholes, tap the sewer where necessary and fill from these locations.

B. Sewer main less than 15" diameter that have not been removed.
1. Description: Abandon and plug a segment of existing sanitary sewer main by bulkheading each end.
2. Materials:
a. Bulkhead: Brick or concrete masonry, or any Director of Public Works or their Designee approved commercial grade concrete.
3. Construction:
a. Do not proceed until ordered by Director of Public Works or their Designee.
b. Abandon sewer at locations designated in the plan or as directed by Director of Public Works or their Designee.
c. Bulkhead sewer pipe at each end.

C. Manhole
1. Description: Abandon sanitary sewer manholes as shown in the Drawings or as designated by Director of Public Works or their Designee.
2. Materials: Follow 02 41 19 paragraph 3.06.
3. Construction: Follow 02 41 19.

D. Sewage force main.
1. Description: Abandon and plug a segment of existing force main by "cutting it off" from the system. The work also includes securely capping or plugging the cut end of the main.
2. Materials: Concrete plug or restrained plug.
3. Construction:
a. Prior to proceeding with the cut-off, notify the Director of Public Works or their Designee.
b. When authorized to proceed, isolate and shut-off the existing force main.
c. Cut of the force main at the location designated for abandonment.
d. Install a concrete pipe plug or restrained plug in the end of the existing main which is to be abandoned.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Storm sewer and storm water facility mains, maintenance, and collection appurtenances.

B. Underdrains.

1.02 RELATED SECTIONS

A. 33 05 00 - Common Work Results for Utilities.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM C76 - Standard Specification for Reinforced concrete Culvert Storm Drain, and Sewer Pipe.
2. ASTM C361 - Standard Specifications for Reinforced Concrete Low-Head Pressure Pipe.
3. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
4. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
5. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
6. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
7. ASTM C507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
8. ASTM C698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil using Standard Effort.
9. ASTM A760 - Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers, and Drains.
10. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.

B. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
2. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500- mm (12- to 60-in.) Diameter.
3. AASHTO Section 30 - Standard Specification for Highway Bridges, Division II, Section 30, Thermoplastic Pipe.
4. AASHTO M36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers, and Drains.

C. United States Department of the Interior - Bureau of Reclamation. Standard Specifications for Reinforced Concrete Pressure Pipe.

D. American Water works Association (AWWA):
1. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated fittings 4 In. Through 12 In. for Water Distribution.
2. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated fittings 14 In. Through 48 In.

PART 2 - PRODUCTS

2.01 STORM SEWER

A. Main lines:
1. Concrete pipe.
a. Joints: Rubber-gasket following SWS 3.2.11.
b. Reinforced concrete pipe (RCP): Follow ASTM C76 and SWS 8.6.0.
c. Where shown on Drawings.
2. High density polyethylene (HDPE):
a. Follow AASHTO M252 and M294 Type S. Class III-A.
b. Joints:
1) Follow AASHTO requirements for water tightness.
2) Reinforced integral bell and gasketed spigot pipe end.
3) Double bell couplings.
c. Smooth interior.
d. Dual wall.
e. Advanced Drainage System, Inc. N-12 Dual Wall Pipe or approved equal.

B. Structures:
1. Manholes:
a. Follow SWS 3.5.0 and SWS 8.39.0.
b. Follow ASTM C478.
c. If not shown on Drawings: 48-inch inside diameter (minimum).
2. Manhole joints:
a. Rubber O-ring gasket.
b. Two continuous rings of butyl rubber sealant.
1) EZ-Stik.
2) Kent Seal.
3) Approved equal.
3. Catch basin:
a. Follow SWS 3.6.0 for precast. 2’ x 3’.
4. Steps:
a. Plastic steps shall be provided in accordance with SWS 3.5.4(g).
b. Manholes and catch basins less than 4 feet do not require steps.
5. Catch basin frame and cover: Neenah R-3246 with Type C grate or approved equal.
6. Manhole frame and cover: Neenah R-1550 with Type “B” self-sealing, concealed pick hole, no vents.
7. Low profile frame and cover: Neenah R-1689 with Type “B” self-sealing, concealed pick hole, no vents.
8. Beehive inlet frame and grate: Neenah R-2560-D3.
9. Concrete block: Follow State Specifications 519.2.2 (salt resistant pink block).
10. Inlet and catch basin mortar: Follow State Specifications 519.2.3.
11. Pipe to manhole connection: SWS 3.5.7 and mortared only.

12. Grade adjusters for castings:
    a. Cretex Pro-Ring. Interior and exterior dimension of ring shall match dimensions of the manhole cone section or catch basin.
    b. Do not use bricks, stones, wood, or pieces thereof.
    c. Adhesive/sealant: per Cretex requirements.
13. Flat decks:
    a. HS20 design loading.
    b. Offset opening.
    c. City approval required.

C. Apron endwalls: Follow State Specifications 520 through 525 for apron endwalls and same material as pipe.

D. Pipe grates: Follow SWS 8.16.0. All pipe inlet and outlet sections greater than 18-inches.
1. Grate shall be hinged on top and locked.
2. Vertical on inlets.
3. Horizontal on outlets.
4. 6-inch bar spacing.
5. Padlock with two keys. Master Lock or approved equal.

E. Culvert pipe:
1. Concrete pipe.
    a. Joints: Rubber-gasket following SWS 3.2.11.
    b. Reinforced concrete pipe (RCP): Follow ASTM C76 and SWS 8.6.0.
    c. Reinforced concrete horizontal elliptical pipe: Follow ASTM C507 and SWS 8.6.0.
    d. Where shown on Drawings.
2. Other material approved by Director of Public Works or their Designee.

2.02 UNDERDRAINS

A. Follow State Specifications 612.

2.03 SUMP MANIFOLD

A. Pipe. If not shown on Drawings, use one type from following:
1. Polyvinyl chloride and fittings solid wall:
    a. 4 through 15 inches: Type PSM. Follow ASTM D3034, SDR 35.
    b. Follow SWS 8.3.0 and 8.10.0.
    c. Cleanout frost sleeve: Schedule 40 PVC with Sioux Chief Model 850-4T adjustable access cover set with screw connection. Cast iron. Large model.

B. Sump laterals:
1. Follow SWS 5.3.10 and SWS 5.3.11 and same material as manifold.
2. 4 inches.
3. Connection to manifold: Wyes.
4. Adapt sump lateral to existing sump with PVC reducer and transition coupling for a watertight seal.

C. Drain basin:
1. Nyloplast light duty drain basin or approved equal.
2. 12 inches.
3. 12-inch solid drop-in grate.

2.04 INCIDENTAL CONSTRUCTION

A. Follow 33 05 00 for:
1. Bedding.
2. Cover.
3. Backfill.
4. Location aids.
5. Insulation.
6. Polyethylene film.
7. Surface restoration.

PART 3 - EXECUTION

3.01 STORM SEWER INSTALLATION

A. Follow SWS Part III.

B. Manhole depths shown on the approved plans are approximate.
1. Final rim grades shall be adjusted within 3/8 to 1/2-inch below the existing and proposed pavement grades after the curb and gutter is completed.
2. Manholes shall be initially set to 3/8 to 1/2-inch below binder pavement grade.
3. Neenah R-1979 series adjusting rings shall be used to adjust manhole rims from binder grade to within 3/8 to 1/2-inch below surface pavement grade.
4. Wood shims are not permitted.

C. Cretex Pro-Ring adjustment rings: 6-inch minimum to 15-inch maximum adjusting rings furnished for each manhole. Do not bond to frame.

D. Manhole frame: center on top of cone section.

E. Catch basins.
1. Dual catch basins shall be installed with 10-foot separation and a summit between structures.
2. Install initially to match binder pavement grade, leaving out a 5-foot section of curb on each side of the basin and the entire curb between dual inlets.
a. Provide temporary asphalt flume to direct runoff into catch basin.
b. Adjust to match surface grade at final pavement placement, flume removed, and granular backfill shall be compacted in 6-inch lifts or thoroughly flushed.
c. CLSM (slurry) may be used in place of compacted or flushed granular backfill.
d. Provide new concrete curb and gutter.

F. Before testing, repair or replace piping, valves, fittings, structures, or other parts of system which have visible defects or leakage even if leakage or pressure loss may be below allowable limits.

G. Go-No-Go Test: Follow SWS 3.2.6(i)4.

H. Storm sewer stubs: Bulkhead following SWS 3.2.25(a).

I. Storm sewer televising:
1. All newly installed storm sewers shall be televised prior to acceptance.
2. Follow SWS 7.1.2.
2. Televising to be performed after manhole and pipe installation is complete, including benches, backfill, and testing, but before paving.
3. Contractor shall ensure all lines are flushed and clean prior to televising.
5. Use self-propelled crawler camera with pan-tilt capability.
4. Sewer spans not accepted shall be re-cleaned and re-televised.
5. Cost of cleaning and video recording shall be the responsibility of the Contractor.
6. Contractor shall install sewer plug, or bulkhead, in downstream manhole and shall remain in place throughout the cleaning and televising process, and until final acceptance by the City.
7. Televising shall only be performed by The City of Fort Atkinson Staff, or The Expediters, Inc., 400 N. Summit Drive, Oconomowoc, WI 53066. (800) 657-0879.

3.02 UNDERDRAIN INSTALLATION

A. Follow State Specifications 612.

3.03 SUMP MANIFOLD INSTALLATION:

A. As shown on drawings and:
1. Pitch to inlet or manhole.
2. Bed and cover PVC following SWS 3.2.6.i.
3. Provide cleanouts.

3.04 INCIDENTAL CONSTRUCTION

A. Follow 33 05 00 for:
1. Connecting dissimilar pipe materials.
2. Excavation in pavement.
3. Bedding.
4. Cover.
5. Backfill.
6. Location aids.
7. Insulation.
8. Polyethylene film.
9. Excess excavated material.
10. Surface restoration.

3.05 STORM SEWER ABANDONMENT

A. Sewer main.
1. Description: Abandon and plug a segment of existing storm sewer main by bulkheading and filling with cellular concrete.
2. Materials:
a. Bulkhead: Brick or concrete masonry, or any Director of Public Works or their Designee approved commercial grade concrete.
b. Cellular concrete: Follow SWS 8.35.5 with minimum 500 psi compressive strength.

3. Construction:
   a. Do not proceed until ordered by Director of Public Works or their Designee.
   b. Abandon sewer at locations designated in the plan or as directed by Director of Public Works or their Designee.
   c. Bulkhead and fill the abandoned sewer pipe with cellular concrete.
   d. If the sewer cannot be completely filled from existing manholes, tap the sewer where necessary and fill from these locations.

B. Manhole.
1. Description: Abandon storm sewer manholes as shown in the Drawings or as designated by Director of Public Works or their Designee.
2. Materials: Follow 02 41 19 paragraph 3.06.
3. Construction: Follow 02 41 19.

C. Inlets.
1. Description: Storm sewer inlets to be abandoned shall be removed completely and backfilled with granular material.
2. Materials: Follow 02 41 19 paragraph 3.04.
3. Construction: Remove completely.

END OF SECTION

SECTION 34 71 00

ROADWAY CONSTRUCTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Earthwork.

B. Base course.

C. Pavement and surface course.

D. Incidental construction:
1. Curb and gutter.
2. Sidewalks.
3. Curb ramps.
4. Drive approaches, and driveways.
5. Pavement sawing.
6. Traffic control.
7. Restoration.

1.02 RELATED SECTIONS

A. 01 22 00 - Unit Prices.

B. 01 43 26 - Inspection and Testing Agency Qualifications.

C. 31 22 00 - Grading.

D. 31 32 19 - Geogrid for Soil Stabilization.

1.03 REFERENCES

A. ASTM D698 - Standard Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.

B. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO T22 - Standard Method for Compressive Strength of Cylindrical Concrete Specimens.
2. AASHTO T23 - Standard Method of Test for Making and Curing Concrete Test Specimens in the Field.
3. AASHTO T52 - Standard method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method.

1.05 REGULATORY REQUIREMENTS

A. Pay for local, county or state permits for Work on rights-of-way. Damage to pavements and to all property, public and private, due to this Work shall be repaired to same condition before construction by Contractor.

1.06 QUALITY MANAGEMENT PROGRAM

A. As a condition of acceptance, arrange, conduct, and pay for tests necessary to demonstrate satisfactory compliance with Contract Documents. Adjust at the plant necessary to meet requirements of Specifications including the instructions.

B. Lab testing:
1. Test material from the plant at least once a day. Supply test results to Director of Public Works or their Designee within 4 hours of start of production.
2. Meet the following parameters:
a. Air voids (Va): Follow State Specifications 460.2.8.3.1.6 and follow State Specification - Additional Special Provision 460.2.1 issued under ASP-6.
b. Voids in the mineral aggregate (VMA): Follow State Specifications Table 460-1.
c. Gradations: Job mix formula (JMF): Follow Paragraph 1 of State Specification - Additional Special Provision 460.2.8.2.1.5 issued under ASP-6.

C. Density testing:
1. Take a minimum one test per location per layer per day and one test during first 40 tons and additional tests per 100 tons asphalt.
a. Use nuclear method.
b. Targets specified hereinafter.
2. Locations will be at Director of Public Works' or their Designee's request.

D. Results and reports:
1. Make field adjustments to keep material within specified tolerances. If test results fall out of tolerance, increase testing frequency until material is within specification.
2. Submit test reports within 48 hours to Director of Public Works or their Designee.

PART 2 - PRODUCTS

2.01 EMBANKMENTS

A. Follow State Specifications 207. Do not use logs, stumps, brush, perishable material, frozen material, or humus-bearing materials. No large stones or lumps within 24 inches of the surface within a one-to-one slope distance of the edge of shoulder.

2.02 EXCAVATION BELOW SUBGRADE (EBS) BACKFILL

A. Breaker run: State Specification 311, maximum particle size three inches.

B. Pulverized asphaltic pavement with 100 percent passing a 1-1/4-inch sieve.
1. Breaker run after all excess pulverized material has been used.

C. Geotextile subgrade stabilization material: Follow 31 32 19.

2.03 BASE COURSE AND CRUSHED AGGREGATE SHOULDERS

A. Follow State Specifications 305.

B. Roadway and shoulders:
1. 1-1/4-inch crushed limestone.
2. Pulverized asphaltic pavement with 100 percent passing a 1-1/4-inch sieve.

C. Curb and gutter:
1. 1-1/4-inch crushed limestone.
2. Pulverized asphaltic pavement with 100 percent passing a 1-1/4-inch sieve.

D. Drive approach, concrete pad, sidewalk, and shoulders: 3/4-inch crushed limestone.

E. Reclaimed asphaltic pavement: Follow State Specifications 305.2.2.2.

2.04 ASPHALTIC CONCRETE (HMA) PAVEMENT

A. Asphaltic pavements shall conform to State Specifications 460.2.7, and the following:

Street Classification	Binder	Surface
Residential	3 LT 58-28 S	5 LT 58-28 H
Collector Streets	3 LT 58-28 S	5 LT 58-28 H
Arterial and Industrial Streets	3 HT 58-28 S	4 HT 58-28 S

. Tack coat: Follow State Specification 455.2.5 asphaltic material CSS-1h.

2.05 INCIDENTAL CONSTRUCTION

A. Concrete curb and gutter:
1. Follow State Specifications 601.
2. Do not add calcium chloride.

B. Concrete sidewalks, and ramps:
1. Follow State Specifications 602.2.
2. Do not add calcium chloride.

C. Curb ramps.
1. Detectable warning field color: Unpainted.
2. Follow State Specifications 602.2. Neenah R-4984.

D. Drive approaches, and driveways.
1. Concrete:
   a. Follow State Specifications 501.
   b. Do not add calcium chloride.

E. Pavement marking: Follow State Specifications 646 and:
1. Epoxy.
2. Glass beads: Follow State Specifications 646.2.3.

F. Traffic Control: Follow State Specifications 643.

G. Restoration: Follow 32 90 00.

2.06 SOURCE QUALITY CONTROL

A. Asphaltic paving materials scale: Follow State Specification 450.3.1.1.1.

B. Concrete paving materials scale: Follow State Specification 501.3.4.5.2.

C. Base course materials scale: Follow State Specifications 109.1.4.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Follow 31 22 00.

B. Roadway and drainage excavation. Follow State Specifications 205.3 for:
1. Common excavation.
2. Excavation below subgrade.
3. Overhaul: No allowance for overhaul.

C. Embankment: Follow State Specifications 207.3.
1. Maximum layer thickness: 8 inches.
2. Compaction: Special.
   a. 95 percent of maximum density determined by ASTM D698 (Standard Proctor).
   b. Also allow Director of Public Works or their Designee to inspect prepared subgrade and to witness proof roll test by fully loaded dump truck. Reconstruct where deflection is greater than 1/2-inch.

D. Preparation of roadway foundation: Follow State Specifications 211.3.

3.02 BASE COURSE AND CRUSHED AGGREGATE SHOULDERS

A. Crushed aggregate base course: Follow State Specifications 301 and 305.
1. Compaction: Special.
   a. 95 percent of maximum density determined by ASTM D698 (Standard Proctor).
   b. Also allow Director of Public Works or their Designee to inspect prepared subgrade and to witness proof roll test by fully loaded dump truck. Reconstruct where deflection is greater than 1/2-inch.
2. Allowable deviation from design grade: 1/2-inch.
3. Utility structures: Refer to Division 33 Utilities.
4. Layer thickness:
   a. Roadway and shoulders: 10-inches minimum or pavement design, whichever is thicker.
   b. Curb and gutter: 6-inches.
   c. Drive approach, concrete pad, sidewalk, and shoulders: 6-inches.

3.03 PAVEMENT PULVERIZING SHAPING AND GRADING

A. Follow State Specification 325 and:
1. Remove and stockpile excess pulverized materials to Owner approved location.
2. At completion of each working day, ramp ends of pulverized material flush to adjacent pavement for all traffic lanes.
3. Excavate and remove topsoil and unstable subgrade materials and replace with on-Site sound material.
4. Grade, shape, and compact pulverized materials.

5. Redistribute materials as needed within project to fill areas with insufficient materials, low areas, and settled utility trenches.
6. Move excess material to other areas within the project.
7. Use new crushed stone base material only when existing materials are depleted, and Director of Public Works or their Designee approves.
8. Allow Director of Public Works or their Designee to inspect new base course before paving.
9. Allowable deviation from design grade: 1/2-inch.
10. Utility structures: Set to finish course elevation.
11. Compaction: Standard compaction.
    a. Allow Director of Public Works or their Designee to inspect prepared base course and to witness proof roll test by a fully loaded dump truck. Reconstruct where deflection is greater than1/2-inch.
12. Depth: Full depth of existing asphalt pavement and existing base material.

B. Abutting existing pavement:
1. Provide full depth saw cut at match lines.
2. Provide butt joint at locations specified in field. Anticipate 25 feet length.
3. Pulverize existing pavement within construction limits.
4. Stockpile pulverized materials at location secured by Contractor.
5. Over-excavate, remove, and dispose of earth material over butt joint length.
6. Taper thickness of removed materials from 4 inches at match line to 0 inches at opposite end of butt joint.
7. Re-spread pulverized materials over excavated area.
8. Remove sufficient material to maintain minimum pavement and base thickness as specified herein at saw cut.

3.04 PAVEMENT MILLING

A. Follow State Specification 330 except:
1. Remove milled materials.
2. At completion of each working day, ramp ends of milled material flush to adjacent pavement for all traffic lanes.
3. Allow Director of Public Works or their Designee to inspect before paving overlay.
4. Utility structures: Set to finish course elevation.

B. Abutting existing pavement:
1. Provide full depth saw cut at match lines.
2. Provide butt joint at locations specified in field. Anticipate 25-foot length.
3. Mill existing pavement within construction limits.

3.05 EXCAVATED MATERIAL

A. Remove surplus excavated material from Site. Surplus excavated material for which Owner does not designate a disposal Site shall be disposed at Contractor's cost. See submittal requirements for each disposal Site utilized. After delivery to the designated location, such material shall be graded level by Contractor.

3.06 PAVEMENT AND SURFACE COURSES

A. Tack coat: Follow State Specification 455.3.2.
1. Apply between each layer of asphaltic concrete.

2. Allow to cure before paving.

B. Mill butt joints: Mill and dispose of 1-1/2 inches of existing pavement at locations shown. Minimum width three feet.

C. Asphaltic concrete pavement: Follow State Specifications 450 and 460.
1. Do not use 460.2.8.3 Department Testing.
2. Maximum variations:
   a. 1/8-inch across a 5 feet straight edge.
   b. Thickness: Within 1/4-inch of design.
   c. Finish elevation: Within 1/4-inch of design.
3. Temperatures:
   a. Asphaltic concrete at placement: Between 265- and 330-degrees Fahrenheit.
   b. Subgrade: Above 32 degrees Fahrenheit for a minimum of 24 hours prior to placement.
   c. Air temperature: Follow State Specifications 450.3.2.1.2.3.
      1) Cold weather paving plan will not be accepted.
4. Layer thickness:
   a. Binder: 2.25 inches minimum or pavement design, whichever is thicker.
   b. Surface: 1.75 inches minimum or pavement design, whichever is thicker.
5. Compaction: Follow State Specifications 460.3.3 Maximum Density Method and follow Paragraph 1 of State Specification - Additional Special Provision 460.3.3.1 issued under ASP-6, except minimum density shall not be less than:
   a. 93 percent for binder courses.
   b. 93 percent for surface courses.
6. Saw cut, excavate, and remove unstable binder course, base course, and subgrade materials. Replace removed materials. Clean binder pavement by sweeping or flushing before applying surface pavement.
7. Allow Director of Public Works or their Designee to inspect binder course before applying surface course.
8. Joints: All longitudinal joints shall be hot seams.

3.07 INCIDENTAL CONSTRUCTION

A. Concrete curb and gutter: Follow State Specification 601.3.
1. Joints.
   a. Construct expansion joints at:
      1) 3 feet from inlets or catch basins.
      2) End of curves.
      3) 150 feet maximum intervals.
   b. Construct contraction joints at 10 feet spacing.
      1) Minimum spacing: 6 feet.
      2) Maximum spacing: 20 feet.
      3) Match abutting concrete joints.
      4) Depth: Minimum 2 inches.
2. Curing:
   a. Apply impervious coating within one hour of placement.
   b. Coat all sides of curb including exposed surface after forms removed.
   c. Apply two coats in perpendicular directions.
3. Spot replacement of curb and gutter:
   a. Provide 2 No. 4 epoxy coated bars, 2 feet in length, in pan of existing curb and gutter.

B. Sidewalks: Follow State Specifications 602.3.
   1. Joints.
      a. Provide expansion joints abutting existing construction and structures with 1/2-inch expansion joint filler.
      b. Provide contraction joints at spacing equal to width of walk and:
         1) Minimum 3 feet.
         2) Maximum 12 feet.
         3) Depth: Minimum 1-inch.
         4) Width: Approximately 1/8-inch.
   2. Curb ramps: Follow State Specifications 602.3.
      a. Detectable warning fields shall be constructed at all curb ramps, sidewalk street crossings, and multi-use trail street crossings.
   3. Curing:
      a. Follow State Specifications 415.3.12.
      b. Apply impervious coating within one hour of placement.
      c. Coat all sides of sidewalk including exposed surface after forms removed.
      d. Apply two coats in perpendicular directions.

C. Concrete drive approaches: Follow State Specifications 415.
   1. No driveway shall be constructed within 5 feet if the nearest lot line, and/or within 10 feet of a sanitary sewer lateral, water service, or fire hydrant.
   2. For new construction, residential driveways shall be a minimum of 18 feet wide, and a maximum of 24 feet wide. For reconstruction projects, the City will provide 18 foot wide driveways unless site conditions are restrictive. Property owner may request a driveway width up to 24 feet wide, but is responsible for incremental cost for labor, equipment, and materials.
   3. Joints.
      a. Expansion Joints abutting curb or walk: Use 1/2-inch expansion joint filler.
      b. Contraction Joints: Locate at midpoint of drive, perpendicular to curb.
         1) Minimum spacing 6 feet.
         2) Maximum spacing 12 feet.
   4. Curing.
      a. Follow State Specifications 415.3.12.
      b. Apply impervious coating within one hour of placement.
      c. Coat all sides of concrete drive approach including exposed surface after forms removed.
      d. Apply two coats in perpendicular directions.

D. Pavement sawing. Follow State Specifications 690.3. Cut depth: Full pavement thickness.

E. Pavement marking: Follow State Specifications 646.3.
   1. Apply same day on pavements open to traffic: State Specifications 646.3.1.
   2. Pavement surface temperature:
      a. Epoxy: Above 50 degrees Fahrenheit.
   3. Provide clean pavement to ensure proper bonding.

F. Traffic control: Follow State Specification 643.3.
   1. Warning lights: Type A.

G. Restoration: Follow 32 90 00.

END OF SECTION

APPENDICES

APPENDIX A – MULTI-USE TRAIL STANDARDS

MULTI-USE TRAIL STANDARDS

PURPOSE

The City of Fort Atkinson may require the installation and connection of multi-use trails throughout the community. These standards are meant as a guide for consistent design and construction, the protection and safety of general public, the mitigation of conflicts between path users and neighboring private property owners, and the reduction of long-term maintenance costs.

GENERAL RULES

- Owner/Developer shall be responsible for the cost of design and installation of any required trails.
- These standards shall apply.
    - Exceptions may be granted by the Director of Public Works or their Designee.
        - Any deviation to the design pursuant to these standards shall conform with safety guidelines found in the “Guide for the Development of Bicycle Facilities” by the American Association of State Highway and Transportation Officials” (AASHTO).
- In the absence of the Director of Public Works or their Designee, a Committee of the Building Inspector, Police Chief and Fire Chief shall determine compliance with these standards.

LOCATION CRITERIA

- Multi-use trails shall connect residential areas to other residential areas, park and recreation areas, public transit locations, retail and commercial centers, and major activity centers.
- New trails should be located to connect existing trails to form an integrated system.
- Trails located immediately adjacent to roadways shall be minimized, except as directed by the Comprehensive Plan, and /or the Director of Public Works or their Designee.
- Trails adjacent to roadways shall be separated from the roadway to the maximum extent practicable.

DESIGN

Multi-use trail design shall be part of a development design and/or layout, and the trail/corridor shall conform to AASHTO Guidelines and the following City design standards.

- The trail corridor shall be a minimum 20 feet wide.
    - Accommodate a minimum 8-foot wide8-foot-wide paved surface.
    - Provide for safe passage of two-way traffic.
- A straight (non-curved) path alignment shall conform to a 2% crown slope.
- A curved path alignment shall conform to.
    - A super-elevation of 3%.
    - Minimum radii of curvature in accordance to AASHTO guidelines.
    - Transition the super-elevation of the curve to a straight route, or reverse curve with a 25-foot minimum tangent.
- Areas of reduced sight distance.
    - A double yellow line shall be used to indicate no passing and no traveling to the left of the center line.

- A yellow centerline shall be used 100 feet from an intersection.
- Permanent marking (e.g. signage, paint striping, and name plates) shall be installed with the installation of the pavement.

- Maximum lineal grade of no less the 0.5% and no more than 5%, or per the table in the AASHTO Guidelines, subject to Director of Public Works or their Designee approval.
- If site conditions prevent the opportunity to accommodate a 2 to 4% slope away from the trail to a distance of 6 feet from the path's edge of pavement, then the Director of Public Works or their Designee may grant a waiver. To grant a waiver, the following conditions must exist:
  - Extreme site conditions that prevent conformance with 11.04.8#8, and the waiver shall only apply to the section of path where the extreme site conditions exist.
  - The maximum slope allowed, from the edge of trail base, shall be 3 to 1.
  - Only in severe topographical cases shall the gradual slope be waived on both sides of the trail. In those cases, accommodations shall be made to drain the trail along the lineal length of path, and not to the edge of cross section.
  - Where down slope exists immediately adjacent to the trail, a decorative safety rail shall be installed between slope and trail, with rail design approved by Director of Public Works or their Designee.
- Maintain a minimum of 6-foot horizontal distance from trees, poles, walls, fences or other obstructions.
  - A waiver may be granted by the City if an obstruction is unavoidable, or the obstruction is necessary for the safety of general public (e.g. a guardrail, or bridge).
- Trail pavement shall accommodate a minimum of 10-foot vertical clearance from overhead wires, tree branches, structural members of underpasses, or other obstructions.
- Stream crossings, or wetlands, shall be avoided. If unavoidable, the trail corridor shall minimize disturbance of natural features.
  - Crossing at the narrowest point.
- Owner/Developer shall be responsible for obtaining any permits required by Wisconsin Department of Natural Resources (WDNR), or any other government agency.
- Sheet drainage from streams, or wetlands, across the trail's surface shall be prohibited.
  - Design shall include a bridge, or piping.
  - Shall be designed to accommodate the 10-year recurrence interval flood without raising the upstream or downstream hydraulic grade line by more than 0.001 foot.
  - WDNR permit required design.
    a) Design, and sizing, shall require the review and approval of the WDNR.
  - WDNR permit not needed.
    a) Design, and sizing, shall require review and approval of the Director of Public Works or their Designee.
- Bridge required to cross a drainage way.
  - Owner/Developer shall obtain all necessary permits.
  - Design shall be reviewed and approved by the WDNR, other government agency, or the Director of Public Works or their Designee.
  - Bridge shall have a minimum width of 10 feet.
  - Developer/Sub divider shall be responsible for cost of bridge design, materials, and installation.
- Edge of pavement shall be a minimum of 5 feet from any property line in private ownership.
- Trail shall intersect a sidewalk and street pavement at a right angle, or radial, to sidewalk or street pavement.
- All trails shall connect to a subdivision sidewalk or to street pavement.
- Trail intersections shall meet the requirements of the American with Disabilities Act (ADA), Wisconsin State Statue 66.0909, pertinent federal and state laws, and be subject to the approval of Director of Public Works or their Designee.

- The Director of Public Works or their Designee, Police Chief, and/or Fire Chief may require the design, and installation of bollards, or a gate system, at trail entrances.
  - Bollards, or gate system, shall prevent motor vehicle access to the path.
  - Retain free flow of bicycles or pedestrians.
  - Lock system shall allow emergency vehicle access.

APPENDIX B – CITY APPROVED PLANTINGS

APPROVED STREET TREE LIST

MULTI-STEM TREES ARE PROHIBITED.

SIZE	NAME	VARIETY	MATURE HEIGHT / FT.
SMALL	Crab Apple	Purple Prince	15 - 20
		Red Baron	15 - 20
		Snow Drift	15 - 20
		Velvet Pillar	15 - 20
	Japanese Tree Lilac	Ivory Silk	15 - 25
		Regent	15 - 25
		Snow Cap	15 - 25
	Dogwood	Kousa	25 - 40
	Linden	Summer Sprite	10 - 20
	Flowering Cherry	Snow Goose	15 - 25
	Service Berry	Autumn Brilliance	15 - 25
		Robin Hill	15 - 25
	Horn Beam a/k/a Iron Wood	Hop	15 - 25
		American	15 - 25
MEDIUM	Elm	Frontier	25 - 40
		New Horizon	25 - 40
	Horn Beam	European	30 - 40
	Pear	Callery	25 - 35
		Cleveland	30 - 40
	Linden	Shamrock	30 - 40
		Corinthian	30 - 40
	Choke Cherry	Amur	30 - 40
LARGE	Elm	Accolade	40 - 60
	Gingko	Autumn Gold (male only)	40 - 50
	Hackberry	Common	40 - 60
	Horse Chestnut		50 - 75
	Kentucky Coffee Tree		60 - 75
	Linden	Little Leaf	50 - 75
	Locust	Sky Line	30 - 45
	Oak	Swamp White	40 - 50
	Planetree	Bloodgood London	40 - 50

Approved list is subject to change. Contact Director of Public Works or their Designee for latest approved list.

APPROVED FLOWERING SHRUBS/FLOWERS LIST

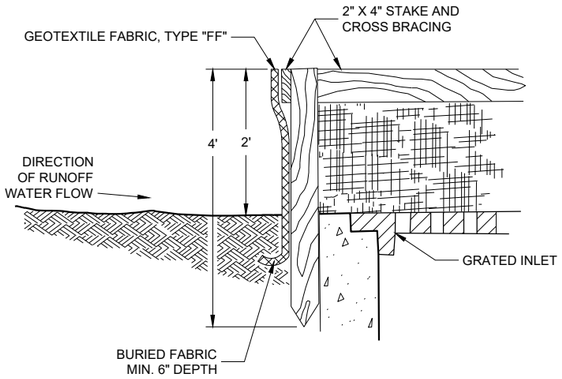
Flowering Shrubs and Flowers	
1	Serviceberry
2	Barberry
3	Cletara
4	Dogwood
5	Compact Burning Bush
6	Hydrangea
7	Nine Bark
8	Potentilla
9	Sumac
10	Azalea
11	Wild Rose
12	Spirea
13	Lilac
14	Viburnum
15	Weigela
16	Boxwood
17	Rhosoendron
18	Holly

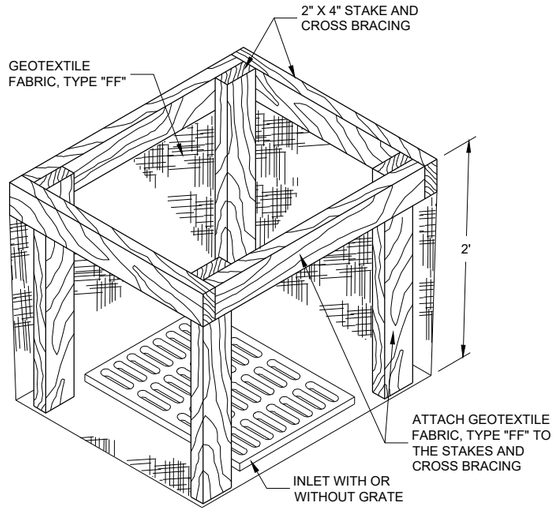
Approved list is subject to change. Contact Director of Public Works or their Designee for latest approved list.

APPENDIX C –STANDARD DETAILS

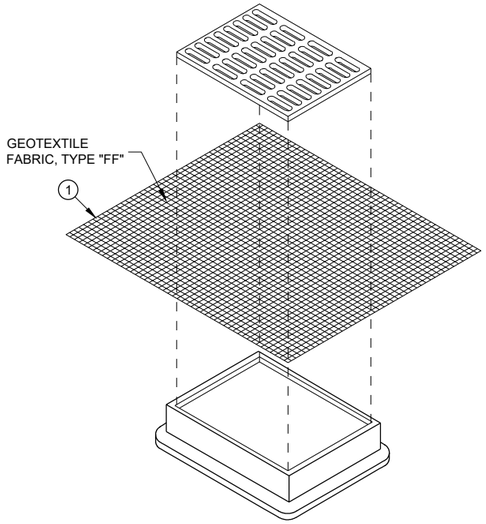
- Erosion Control
- Pavement
- Utility
- Landscaping

SDD 08E10 Inlet Protection, Types A, B, C and D



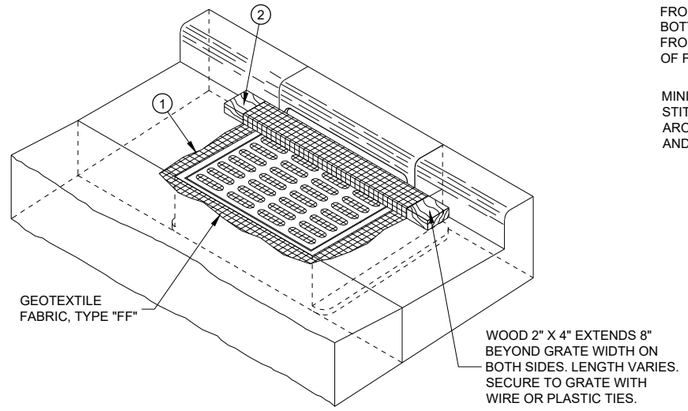


INLET PROTECTION, TYPE "A"

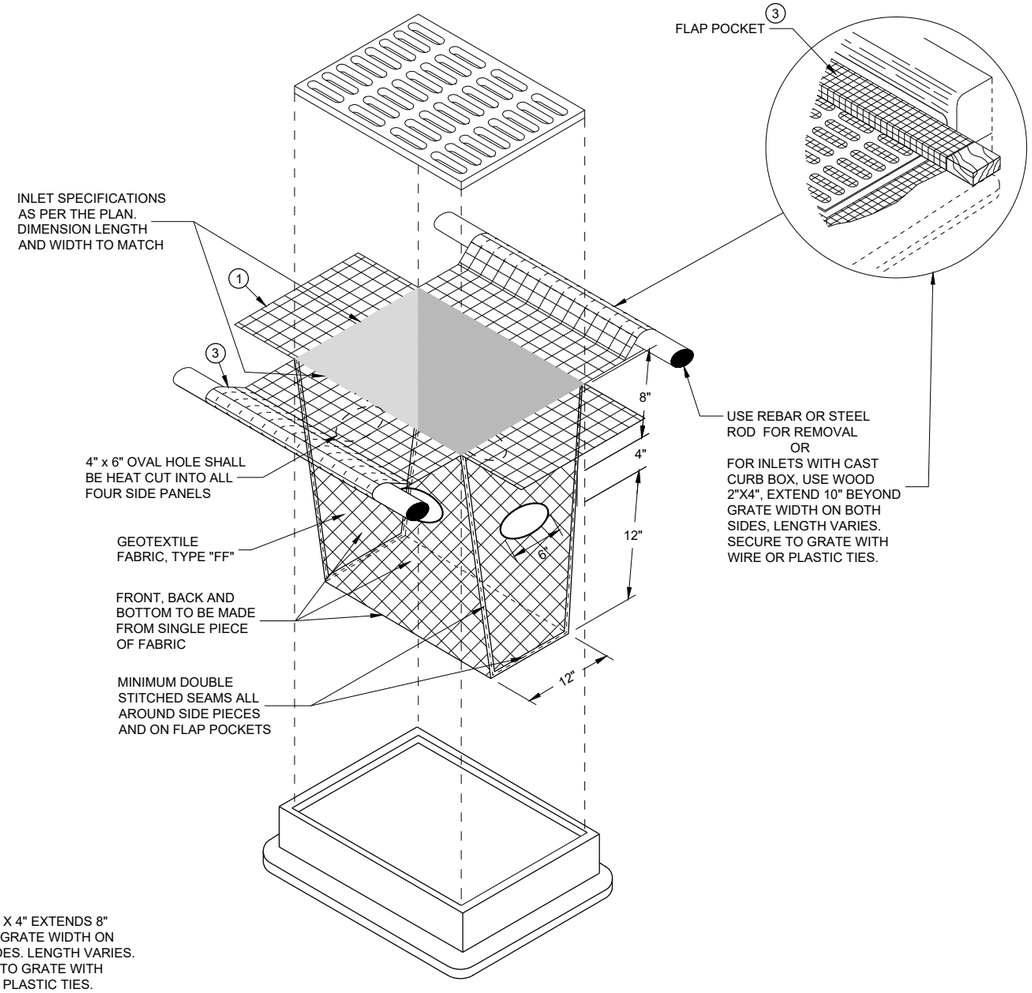


INLET PROTECTION, TYPE "B" (WITHOUT CURB BOX)

(CAN BE INSTALLED IN ANY INLET WITHOUT A CURB BOX)



INLET PROTECTION, TYPE "C" (WITH CURB BOX)



INLET PROTECTION, TYPE "D"

(CAN BE INSTALLED IN ANY INLET WITH OR WITHOUTA CURB BOX AS PER NOTE (2))

GENERAL NOTES

INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER.

MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE DEPARTMENT'S EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.

WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

(1) FINISHED SIZE, INCLUDING FLAP POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

(2) FOR INLET PROTECTION, TYPE C (WITH CURB BOX), AN ADDITIONAL 18" OF FABRIC IS WRAPPED AROUND THE WOOD AND SECURED WITH STAPLES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB BOX OPENING.

(3) FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2X4.

INSTALLATION NOTES

TYPES B & C

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

THE CONTRACTOR SHALL DEMONSTRATE A METHOD OF MAINTENANCE, USING A SEWN FLAP, HAND HOLDS OR OTHER METHOD TO PREVENT ACCUMULATED SEDIMENT FROM ENTERING THE INLET.

TYPE D

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

DO NOT INSTALL INLET PROTECTION TYPE D IN INLETS SHALLOWER THAN 30", MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.

THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL CINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED AT A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.

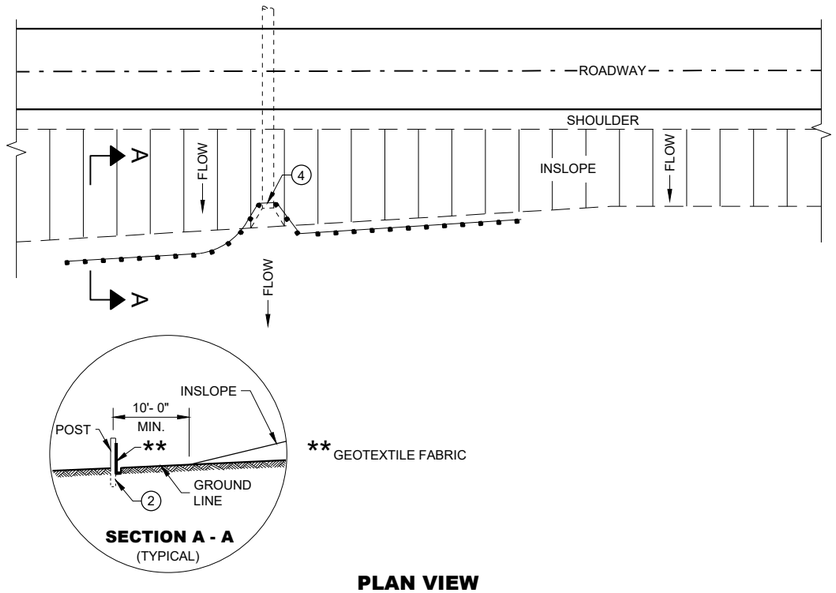
INLET PROTECTION TYPES A, B, C AND D

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

APPROVED
10/16/02 — DATE
/S/ Beth Cannestra — ROADWAY STANDARDS DEVELOPMENT ENGINEER

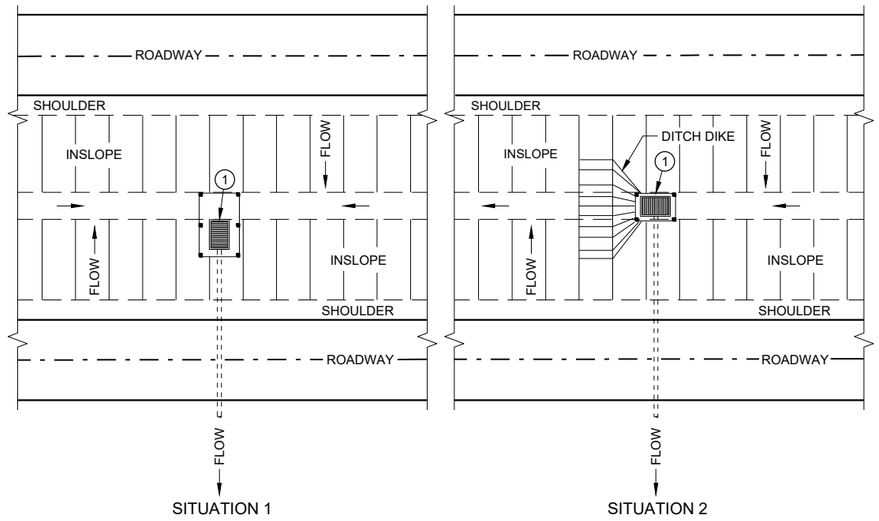
FHWA

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SDD 08E10 - 02



PLAN VIEW

TYPICAL APPLICATION OF SILT FENCE



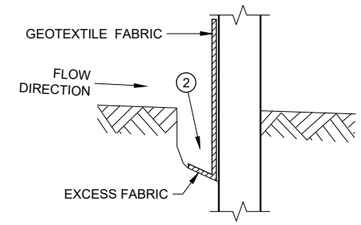
PLAN VIEW

SILT FENCE AT MEDIAN SURFACE DRAINS

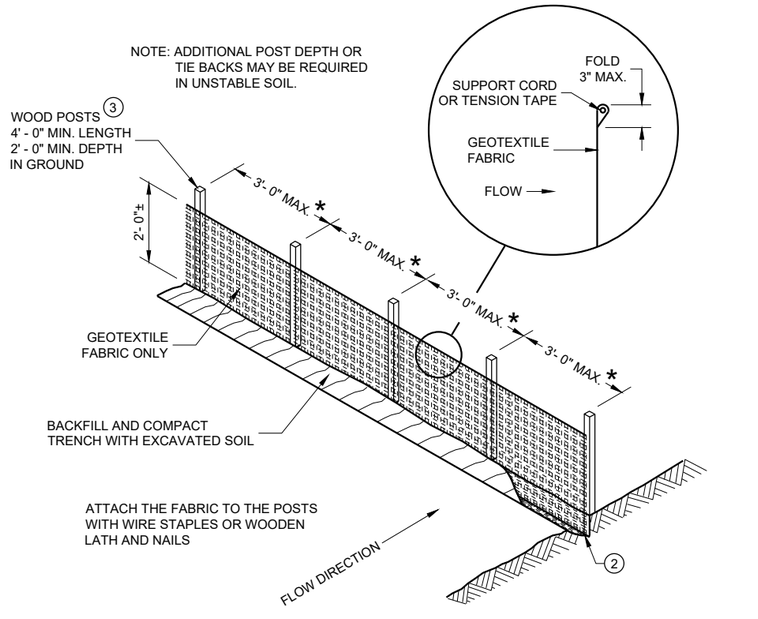
GENERAL NOTES

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

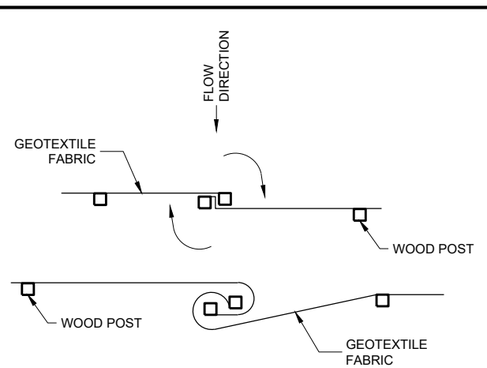
1. HORIZONTAL BRACE REQUIRED WITH 2" X 4" WOODEN FRAME OR EQUIVALENT AT TOP OF POSTS.
2. FOR MANUAL INSTALLATIONS THE TRENCH SHALL BE A MINIMUM OF 4" WIDE AND 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC. FOLD MATERIAL TO FIT TRENCH AND BACKFILL AND COMPACT TRENCH WITH EXCAVATED SOIL.
3. WOOD POSTS SHALL BE A MINIMUM SIZE OF 1 ⅛" X 1 ⅛" OF OAK OR HICKORY.
4. SILT FENCE TO EXTEND ACROSS THE TOP OF THE PIPE.
5. CONSTRUCT SILT FENCE FROM A CONTINUOUS ROLL IF POSSIBLE BY CUTTING LENGTHS TO AVOID JOINTS. IF A JOINT IS NECESSARY USE ONE OF THE FOLLOWING TWO METHODS; A) OVERLAP THE END POSTS AND TWIST, OR ROTATE, AT LEAST 180 DEGREES, B) HOOK THE END OF EACH SILT FENCE LENGTH.



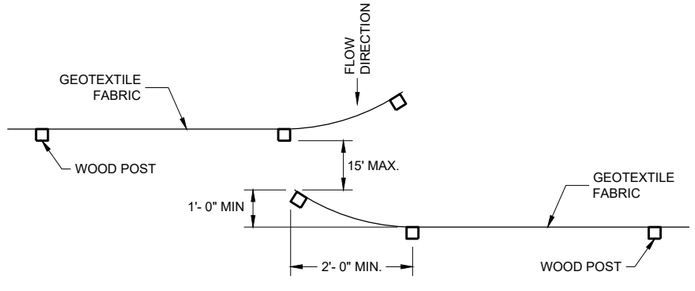
TRENCH DETAIL



SILT FENCE

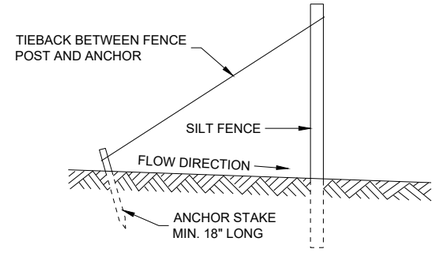


TWIST METHOD



HOOK METHOD

JOINING TWO LENGTHS OF SILT FENCE 5



SILT FENCE TIE BACK

(WHEN REQUIRED BY THE ENGINEER)

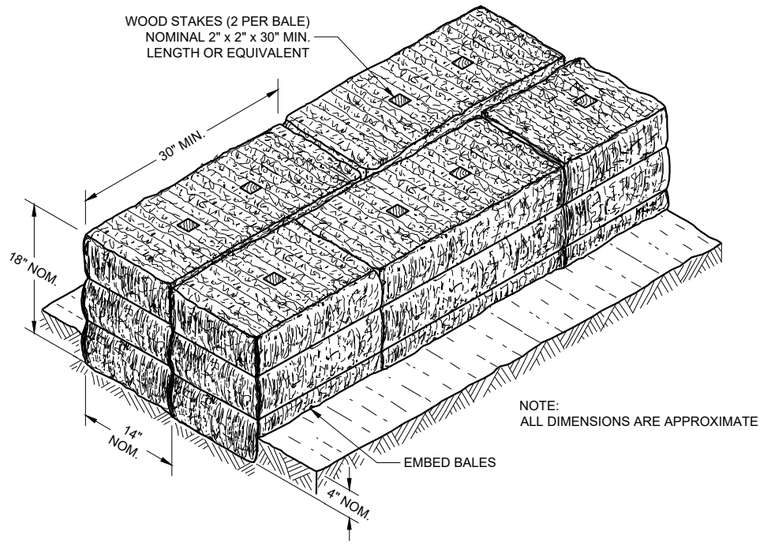
SILT FENCE

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

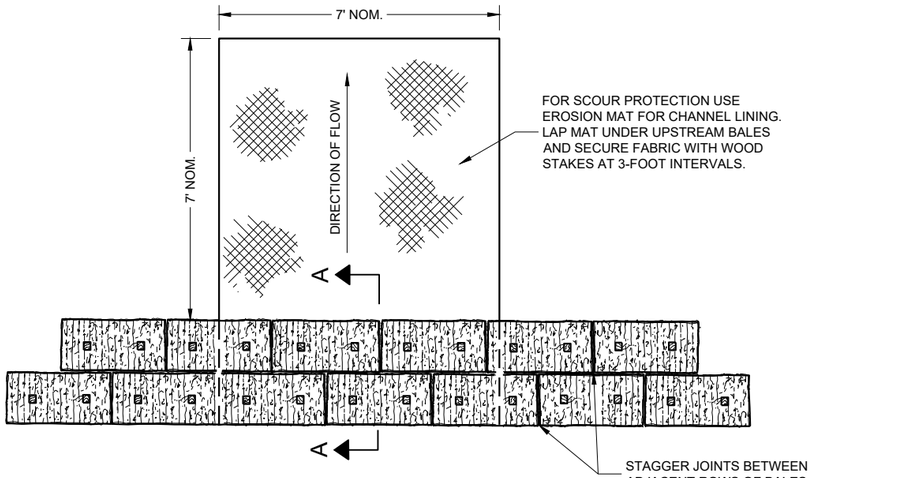
APPROVED
4/29/05 — DATE
/S/ Beth Cannestra — CHIEF ROADWAY DEVELOPMENT ENGINEER
FHWA

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SDD 08E09 - 06

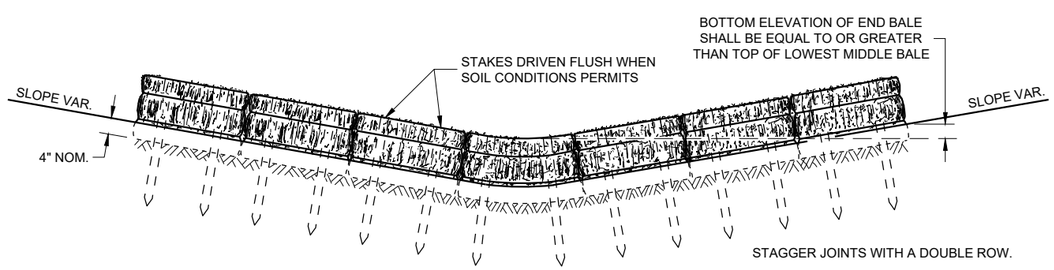
SDD 08E08 Typical Installations of Erosion Bales / Temporary Ditch Checks



SECTION A - A



PLAN VIEW



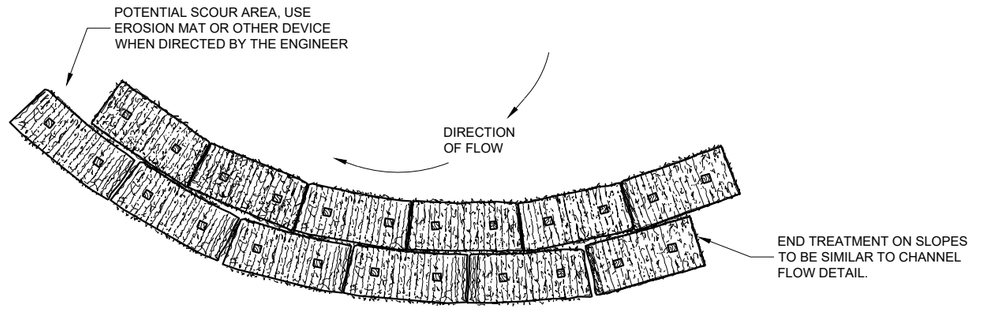
FRONT ELEVATION

TEMPORARY DITCH CHECK USING EROSION BALES (1)

GENERAL NOTES

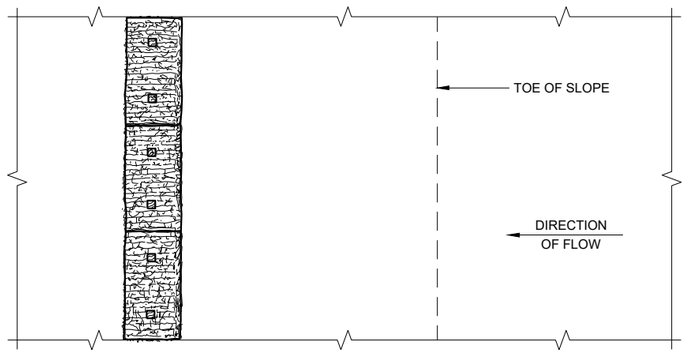
DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

(1) TEMPORARY DITCH CHECKS, EITHER EROSION BALES OR MANUFACTURED SHALL BE PAID FOR UNDER THE BID ITEM OF TEMPORARY DITCH CHECK. THE DEPARTMENT WILL NOT PAY FOR TEMPORARY DITCH CHECKS CONSTRUCTED OF A SINGLE ROW OF EROSION BALES.

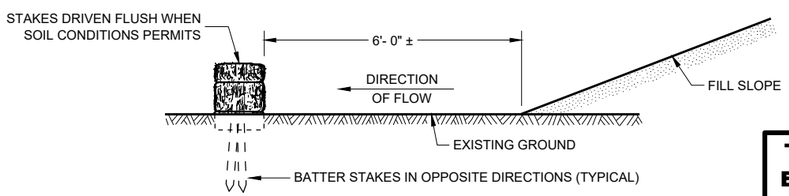


PLAN VIEW

WHEN ALTERING THE DIRECTION OF FLOW



PLAN ELEVATION



FRONT ELEVATION

WHEN EXISTING GROUND SLOPES AWAY FROM FILL SLOPE

EROSION BALES FOR SHEET FLOW

TYPICAL INSTALLATIONS OF EROSION BALES/TEMPORARY DITCH CHECKS

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

APPROVED

6/4/02 — DATE

/S/ Beth Cannestra — CHIEF ROADWAY DEVELOPMENT ENGINEER

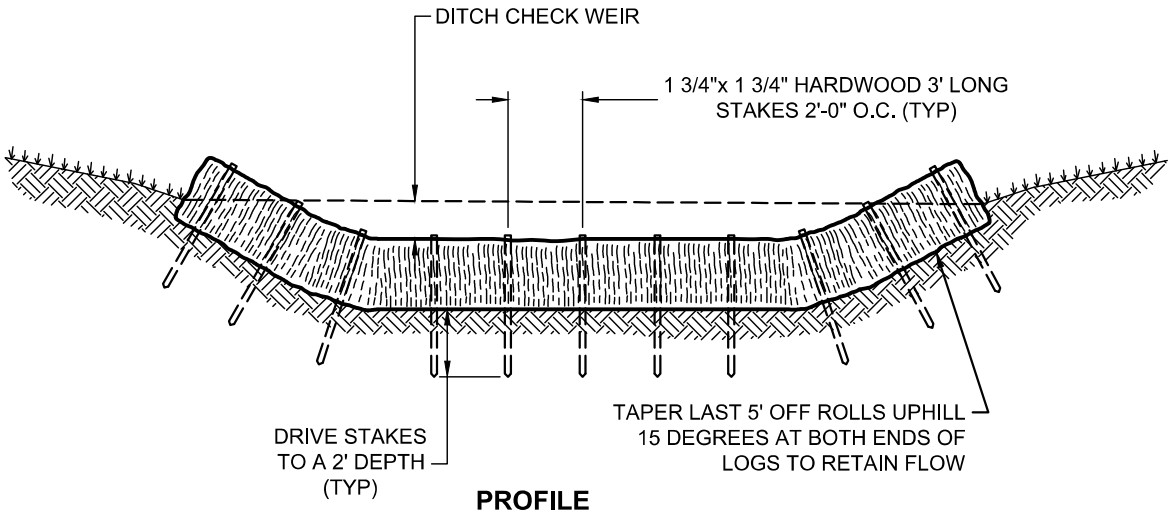
FHWA

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SDD 08E08 - 03

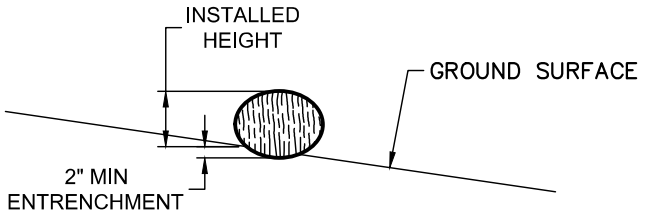
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SDD 08E08 - 03



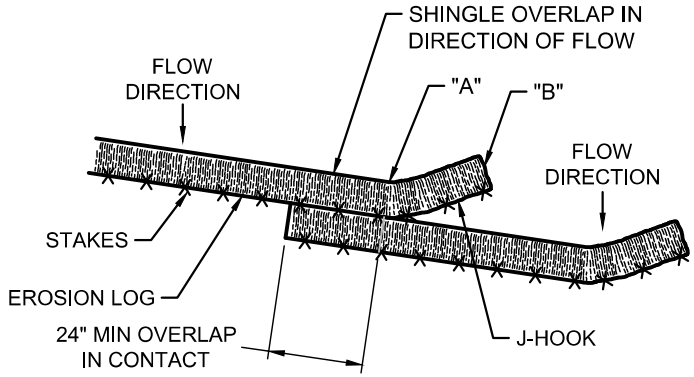
PROFILE

NOTE:
DITCH CHECK SHALL BE INSTALLED SO THAT THE ENDS OF THE CHECK ARE HIGHER IN ELEVATION THAN THE MIDDLE IN ORDER TO FORM A WEIR.



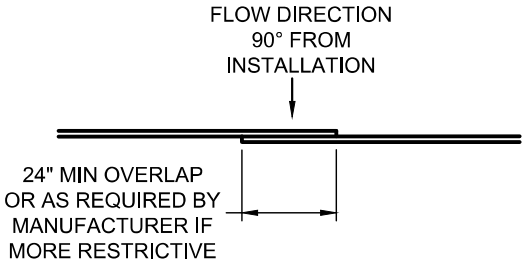
NOTE:
INSTALLED HEIGHT IS MEASURED FROM THE UPSLOPE GROUND SURFACE TO THE TOP OF THE PRODUCT. DUE TO SETTLEMENT AND/ OR DEFORMATION, THE INSTALLED HEIGHT MAY NOT BE EQUIVALENT TO THE NOMINAL DIAMETER OF THE PRODUCT.

CROSS SECTION



NOTES:
1. J-HOOKS SHALL BE INSTALLED SO THAT THE GROUND-PRODUCT INTERFACE ELEVATION TO LOCATION "B" IS HIGHER THAN THE TOP OF THE PRODUCT ELEVATION AT LOCATION "A" TO CREATE WEIR AT POINT "A".
2. J-HOOKS SHALL BE INSTALLED EVERY 2 VERTICAL FEET OF DROP ALONG THE LENGTH OF THE INSTALLATION.
3. STAKE OVERLAP AS REQUIRED BY MANUFACTURER.

SLOPING INSTALLATION
(PLAN VIEW)



TYPICAL INSTALLATION

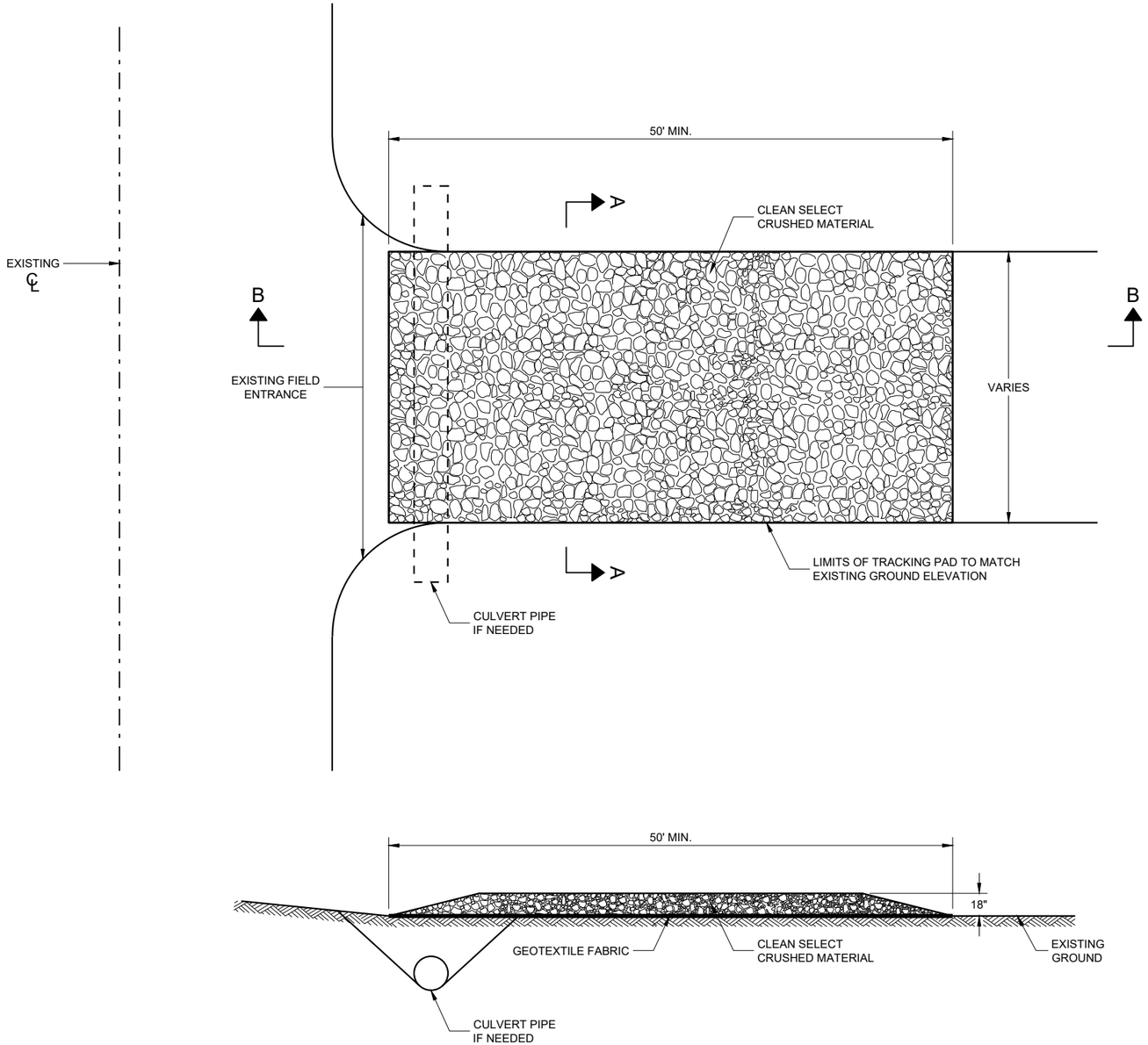
MANUFACTURED SLOPE INTERUPTION AND PERIMETER CONTROL DETAIL

NO SCALE

EC-DITCH-07 16

EC-DITCH-07.DWG

SDD 08E14 Tracking Pad



SECTION B - B

GENERAL NOTES

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

TRACKING PAD SHALL BE INSPECTED DAILY. DEFICIENT AREAS SHALL BE REPAIRED OR REPLACED IMMEDIATELY.

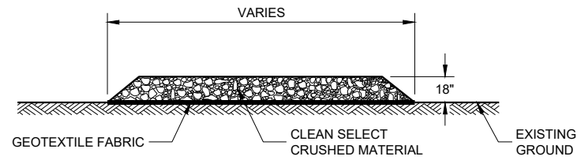
TRACKING PAD TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED.

TRACKING PAD SHALL BE THE FULL WIDTH OF THE EGRESS POINT.

SURFACE WATER MUST BE PREVENTED FROM PASSING THROUGH THE TRACKING PAD. FLOWS SHALL BE DIVERTED AWAY, AROUND OR CONVEYED UNDER THE TRACKING PAD.

CULVERT PIPE OR OTHER BMP USED TO DIVERT WATER AWAY, AROUND OR UNDER THE TRACKING PAD SHALL BE DESIGNED TO CONVEY THE 2 YEAR - 24 HOUR EVENT.

THE COST OF ADDITIONAL BMP TO DIVERT WATER ARE INCIDENTAL TO THE TRACKING PAD BID ITEM.



SECTION A - A

TRACKING PAD

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

APPROVED
3/24/2011
DATE

/S/ Jerry H. Zogg
ROADWAY STANDARDS DEVELOPMENT ENGINEER

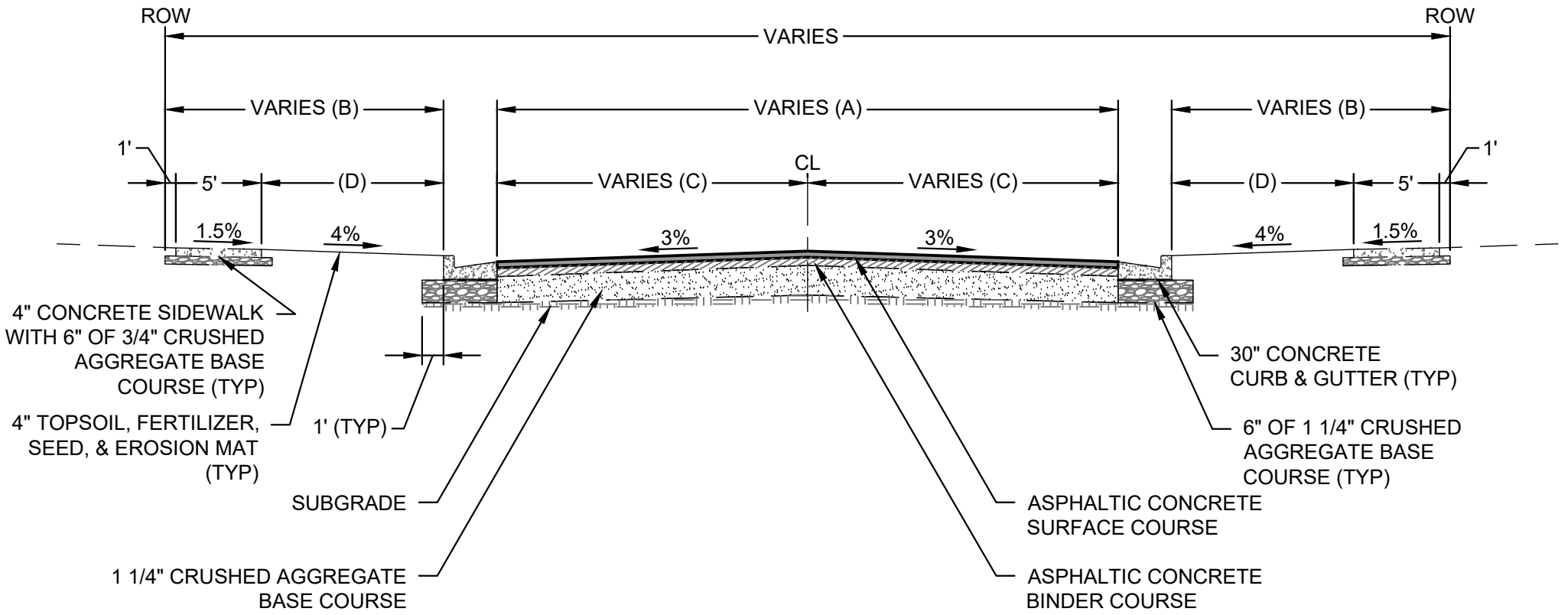
FHWA

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SDD 08E14 - 01

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SDD 08E14 - 01



TYPICAL STREET SECTION (N.T.S.)

NOTES:

1. A PAVEMENT DESIGN BASED ON SECTION 14-10-5 OF THE WISDOT FDM WILL BE CONSIDERED AS ALTERNATE BUT REQUIRES APPROVAL BY DIRECTOR OF PUBLIC WORKS OR THEIR DESIGNEE.

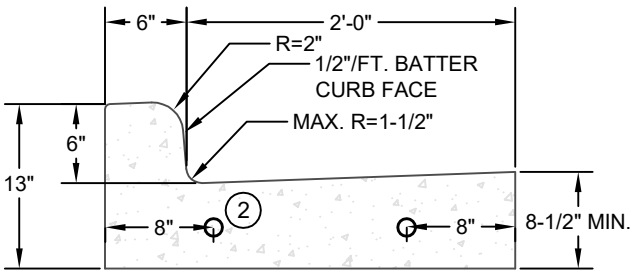
2. SIDEWALK AND DRIVEWAY APRON SHALL HAVE A THOROUGHLY COMPACTED 6" OF 3/4" CRUSHED LIMESTONE DENSE GRADED BASE, AND ALL CONCRETE WITHIN THESE AREAS SHALL BE A MINIMUM OF 6" THICK.

TYPICAL DIMENSIONS

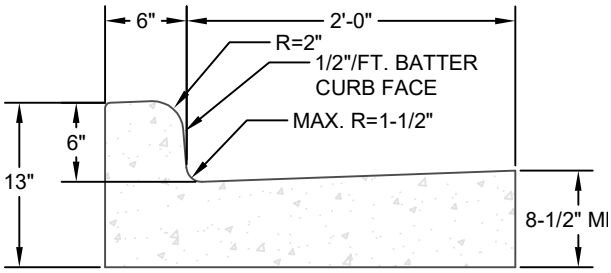
R.O.W.	A	B	C	D	NOTE
60'	26'	14.5'	13'	8.5'	30' F-F
80'	32'	21.5'	16'	15.5'	36' F-F, 2 LANES
80'	44'	15.5'	22'	9.5'	48' F-F, 4 LANES
100'	DETERMINED BY DIRECTOR OF PUBLIC WORKS OR THEIR DESIGNEE.				

CITY OF FORT ATKINSON MINIMUM PAVEMENT DESIGN

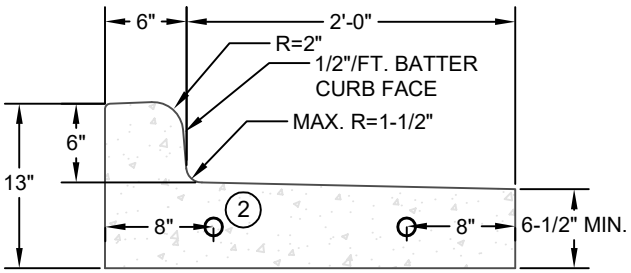
TYPE	ROW	CRUSHED AGGREGATE BASE COURSE	ASPHALTIC CONCRETE PAVEMENT			
			LOWER LAYER		UPPER LAYER	
			TYPE	THICKNESS	TYPE	THICKNESS
LOCAL STREETS	60'	10"	3LT 58-28S	2.25"	5LT 58-28H	1.75"
COLLECTOR STREETS	80'	10"	3LT 58-28S	2.50"	5LT 58-28H	1.75"
ARTERIAL AND INDUSTRIAL STREETS	100'	10"	3HT 58-28S	3.50"	4HT 58-28S	1.75"



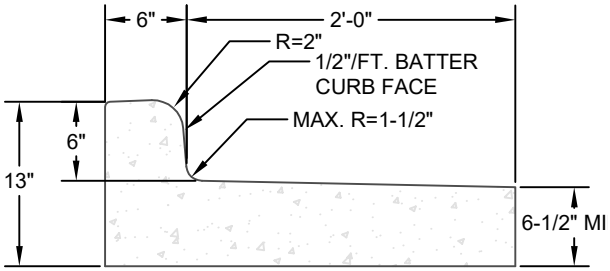
30" STANDARD
REINFORCED CURB (1)



30" STANDARD CURB (1)



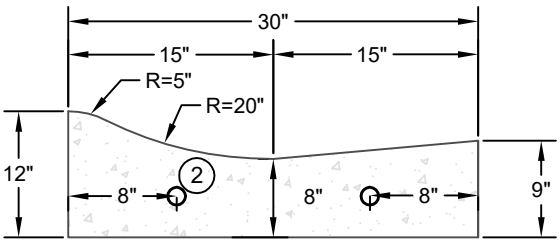
30" REJECT
REINFORCED CURB (1)



30" REJECT CURB (1)

CONCRETE CURB & GUTTER 30"

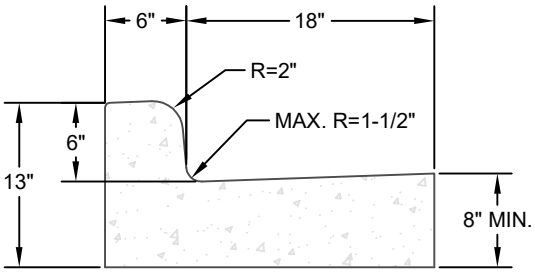
NTS



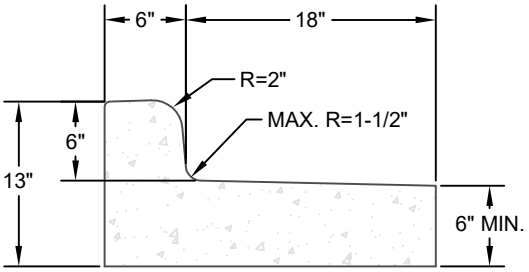
30" ROLLED (3)
REINFORCED CURB

COMMERCIAL
CONCRETE CURB & GUTTER 30"

NTS



24" STANDARD CURB (1)



24" REJECT CURB (1)

CONCRETE CURB & GUTTER 24"

NTS

KEYED NOTES:

(1) TIE BARS ARE REQUIRED FOR CURB AND GUTTER.

(2) TWO CONTINUOUS-#5 BARS EPOXY COATED PER SECTION 505.2.4 OF STANDARD SPECIFICATIONS. (2-#5 18-INCH LONG SMOOTH EPOXY COATED DOWEL BARS WITH BOND BREAKER AT ALL EXPANSION JOINTS. FOLLOW STANDARD SPECIFICATIONS 505.2.6.2.)

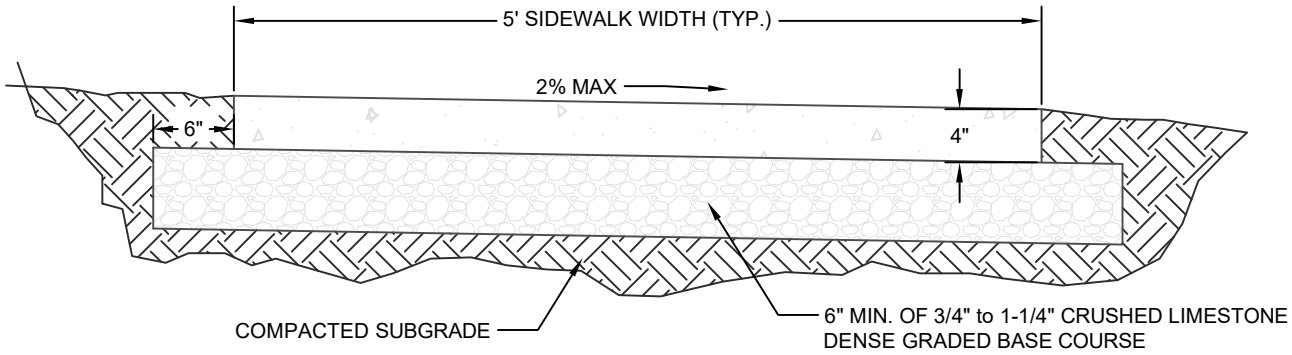
(3) SHALL BE SPECIFIED AT THE DISCRETION, AND APPROVAL, OF THE CITY.

GENERAL NOTES:

LATERAL CONTRACTION JOINTS SHALL BE PLACED AT INTERVALS OF NOT MORE THAN 15' NOR LESS THAN 5' IN LENGTH. THE JOINTS SHALL BE A MINIMUM OF 2" IN DEPTH.

EXPANSION JOINTS SHALL BE PLACED TRANSVERSALLY AT RADIUS POINTS ON CURVES OF RADIUS OF 200' OR LESS, AT ANGLE POINTS, 5' FROM OUTSIDE EDGE OF STORM SEWER INLETS, BETWEEN BACK OF CURB AND CONCRETE SIDEWALK OR DRIVEWAY OR AS DIRECTED BY THE ENGINEER. THE EXPANSION JOINT SHALL BE A ONE PIECE ASPHALTIC MATERIAL HAVING THE SAME DIMENSIONS AS CURB & GUTTER AT THAT STATION AND BE 1/2" THICK.

IN ALL CASES, CONCRETE CURB & GUTTER SHALL BE PLACED ON 6 INCHES MINIMUM OF THOROUGHLY COMPACTED 3/4" to 1-1/4" CRUSHED LIMESTONE, AND SHALL EXTEND TO 1' BEHIND BACK OF CURB.

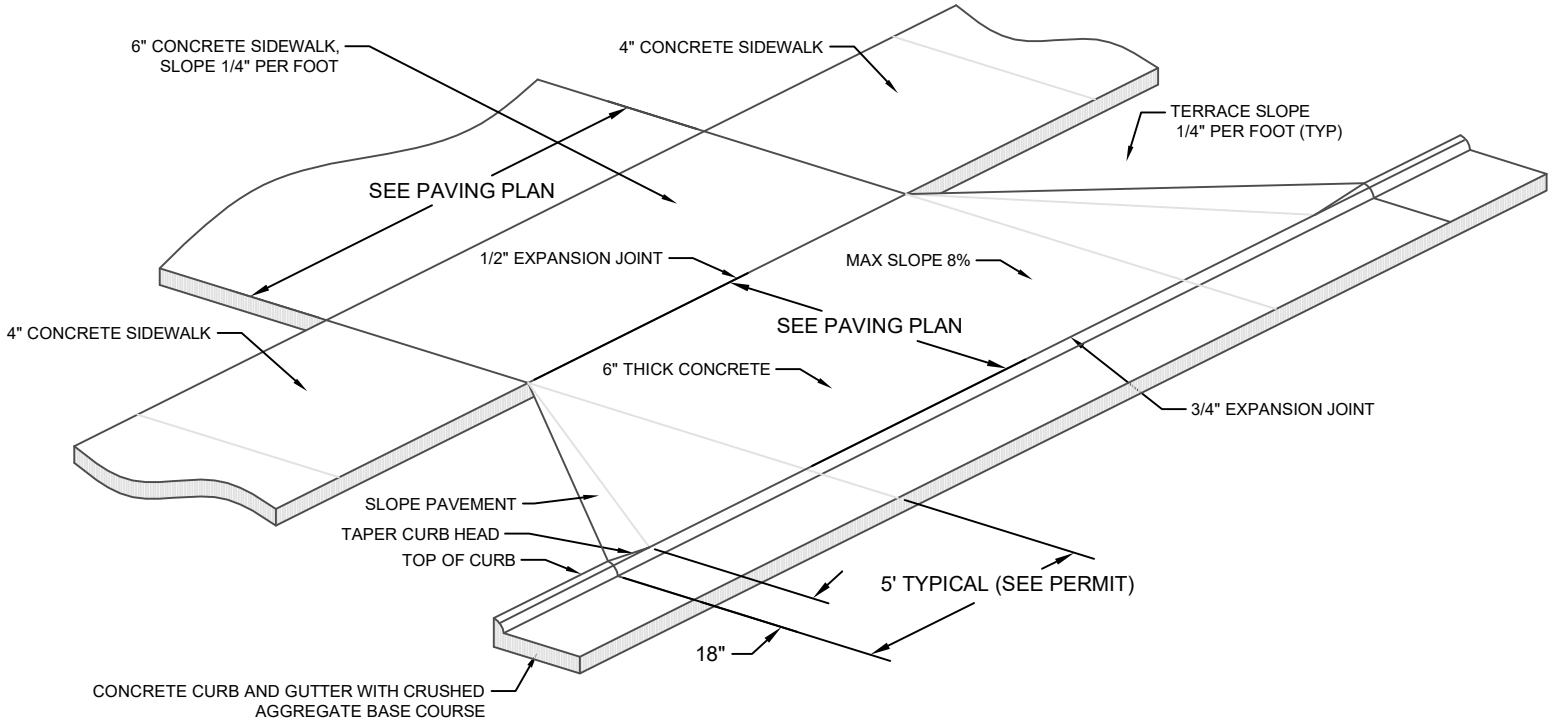


TYPICAL SECTION

NOTES:
1. PROVIDE EXPANSION JOINT EVERY 50' MINIMUM.
2. TOOL CONTROL JOINTS
3. CHANGE DEPTH TO 6" FOR DRIVEWAY CROSSINGS

CONCRETE SIDEWALK

NTS



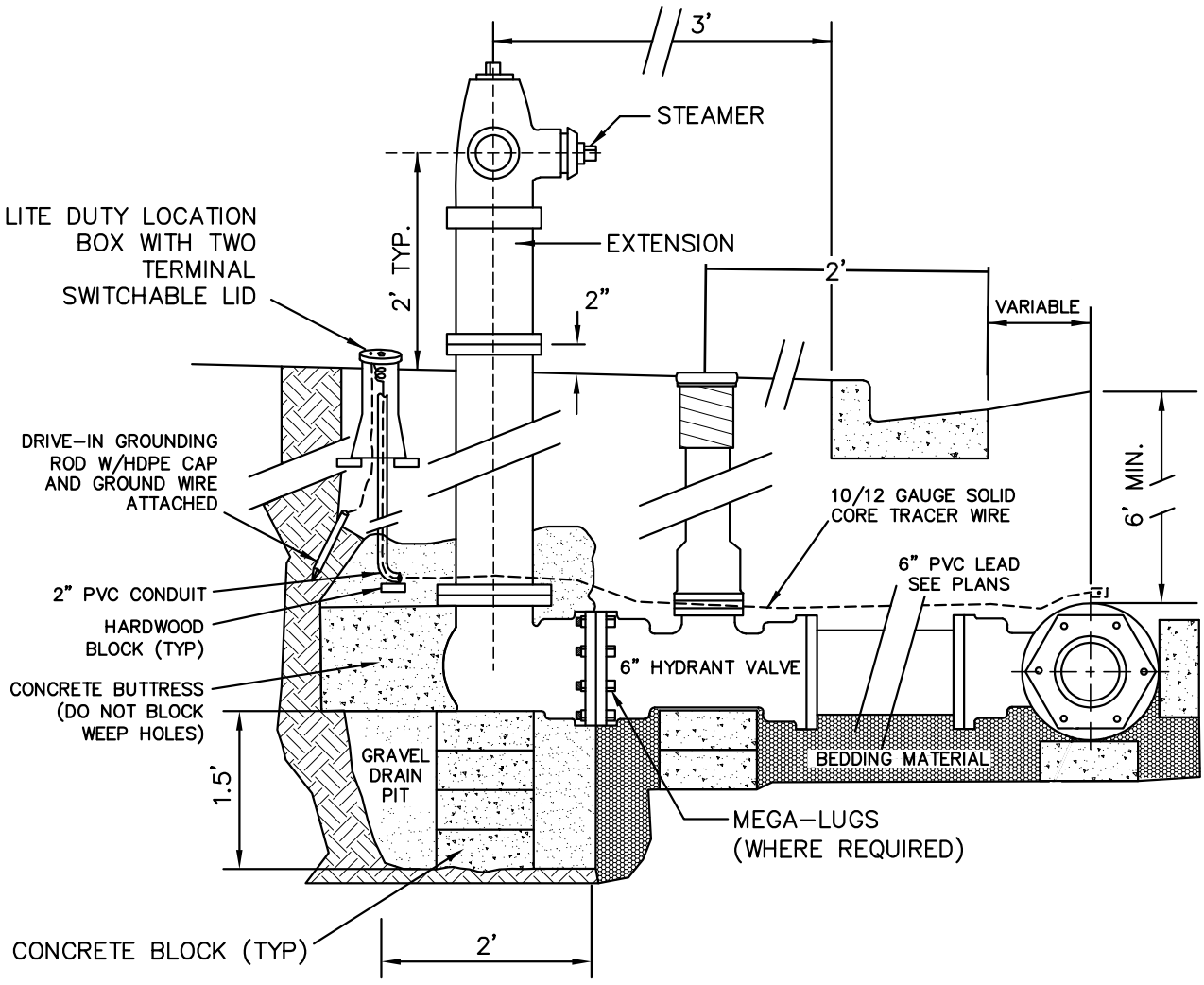
NOTE: SIDEWALK AND DRIVEWAY APRON SHALL HAVE A THOROUGHLY COMPACTED 6" OF 3/4" TO 1-1/4" CRUSHED LIMESTONE DENSE GRADED BASE, AND ALL CONCRETE WITHIN THESE AREAS SHALL BE A MINIMUM OF 6" THICK.

DRIVEWAY APRON/ENTRANCE

NTS

TYPICAL HYDRANT CONNECTION DETAIL

(N.T.S.)



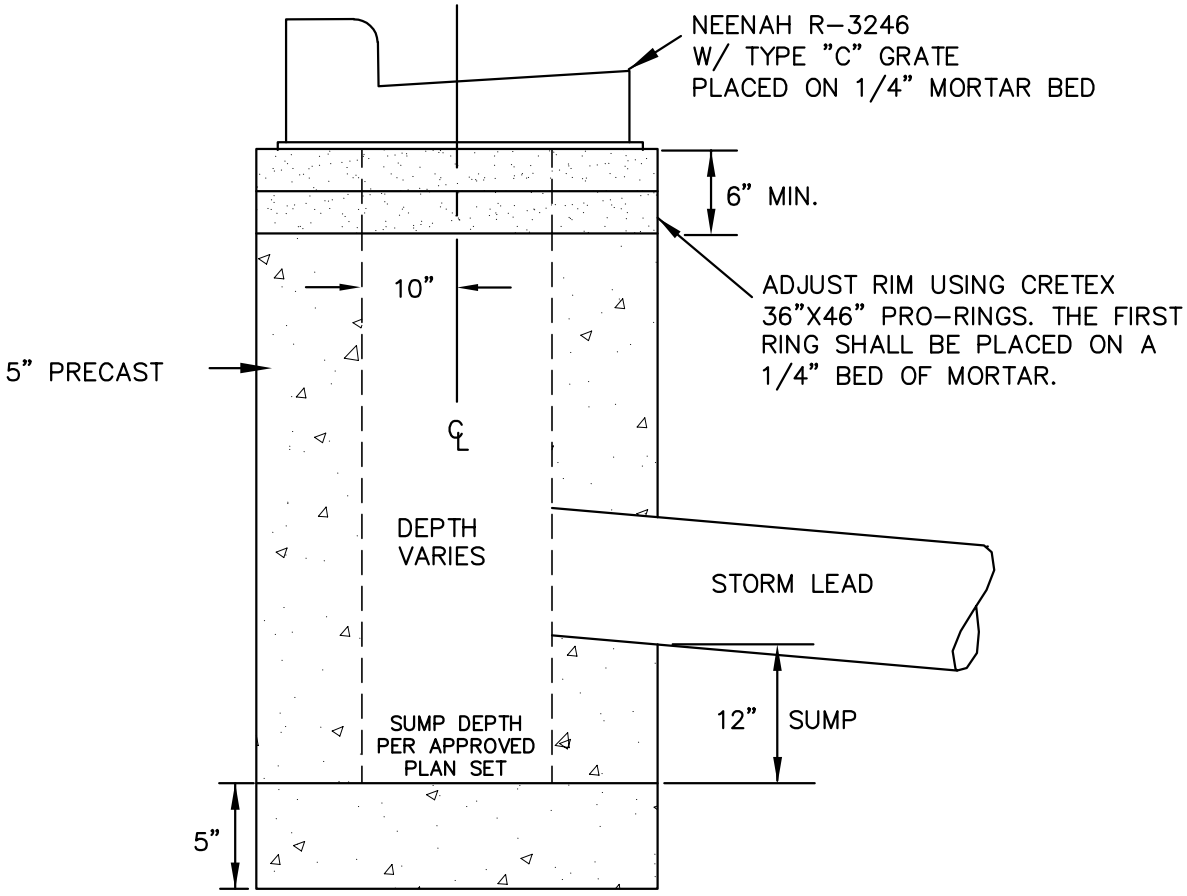
NOTES:

1. RODDING OF HYDRANT MAY BE REQUIRED IF SOILS ARE UNSUITABLE FOR BUTTRESS PLACEMENT.
2. ENCASE ENTIRE BRANCH AND VALVE IN POLYETHYLENE WRAP.
3. ALL TRACER, AND GROUND WIRE SHALL HAVE 12" OF COILED WIRE WITHIN THE BOX TO ALLOW FUTURE ACCESS.
4. ALL TRACER WIRE SHALL BE ATTACHED TO THE TOP OF THE MAIN, LEAD, AND SERVICE LATERALS AT 10' INTERVALS.

TYPICAL 24" X 36" STORM CATCH BASIN DETAIL

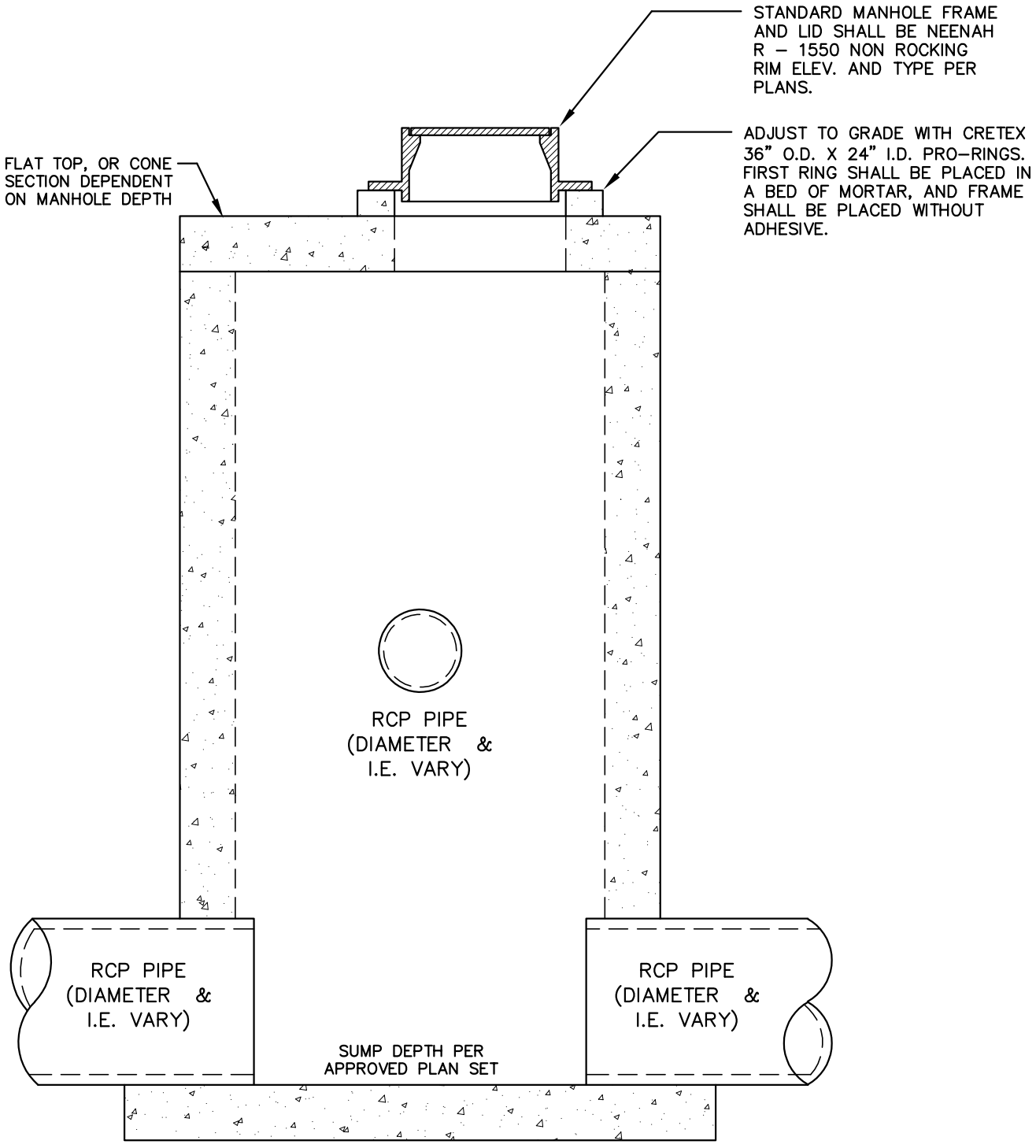
(N.T.S.)

INLET TO BE PROTECTED WITH GEOTEXTILE FABRIC BETWEEN THE GRATE AND FRAME. PROTECTION TO REMAIN IN PLACE UNTIL SITE VEGETATION IS ESTABLISHED.



STORM MANHOLE DETAIL

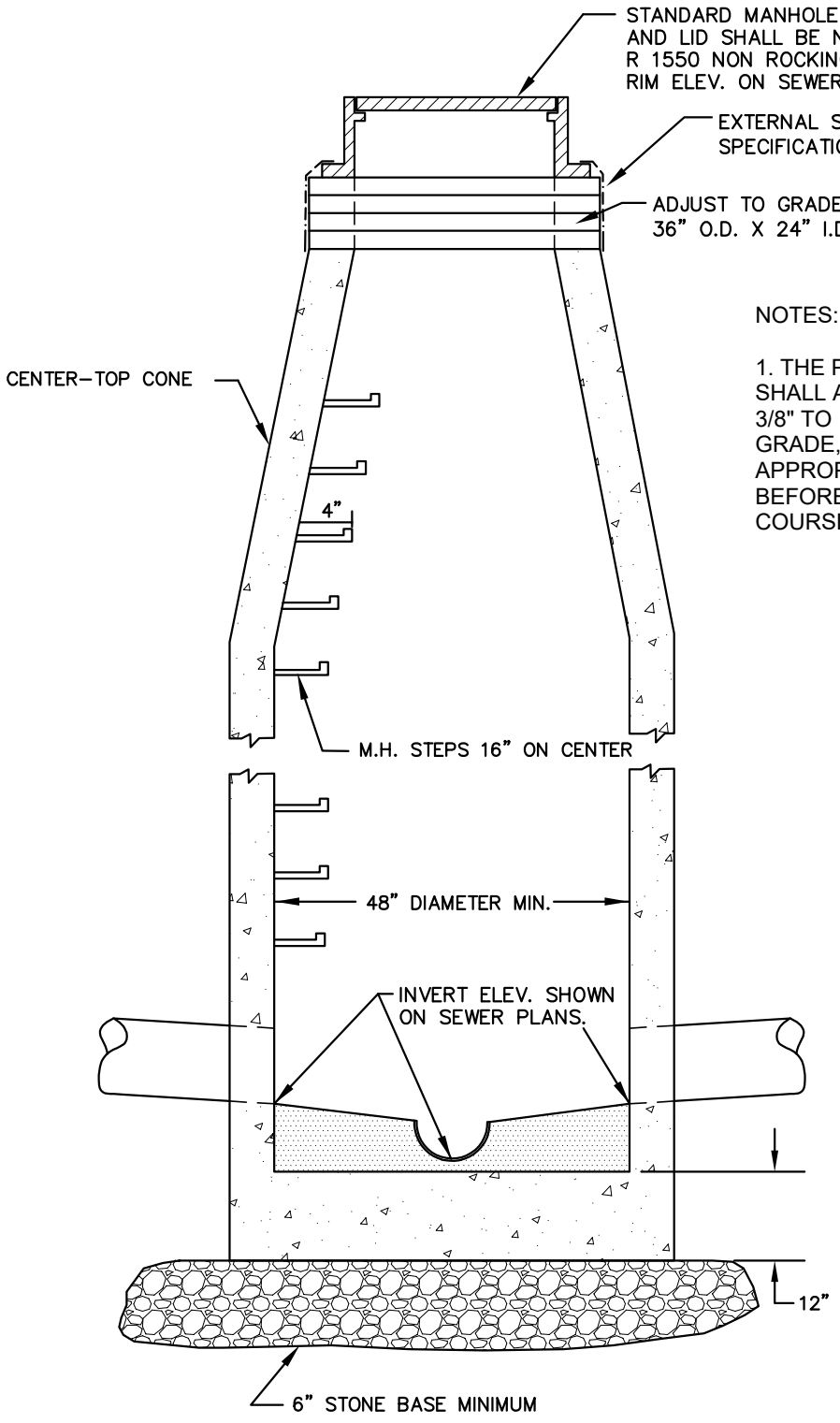
(N.T.S.)



TYPICAL SANITARY MANHOLE DETAIL

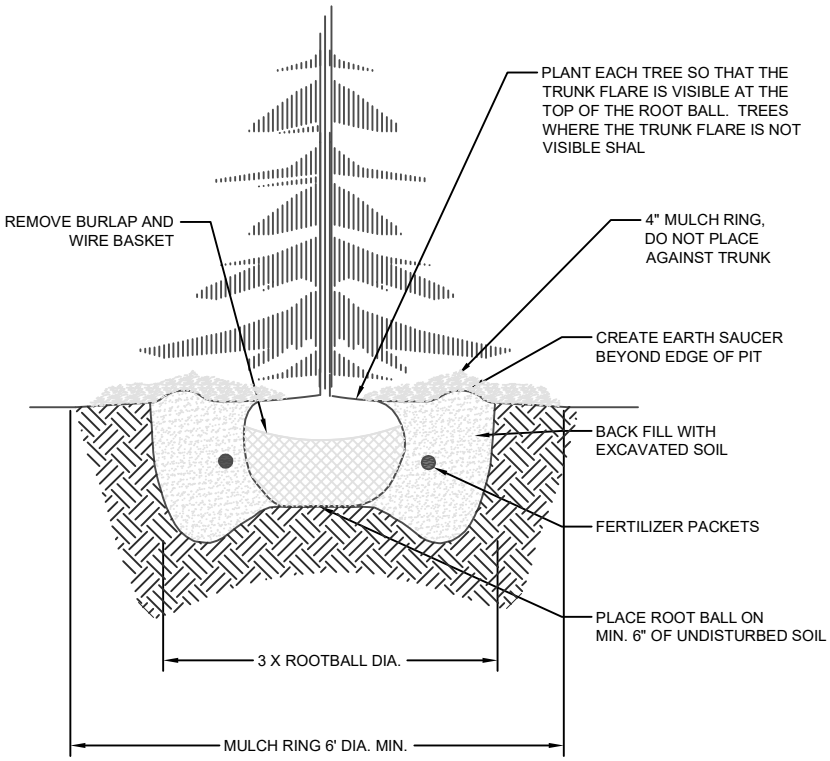
CONCENTRIC CONE

(N.T.S.)



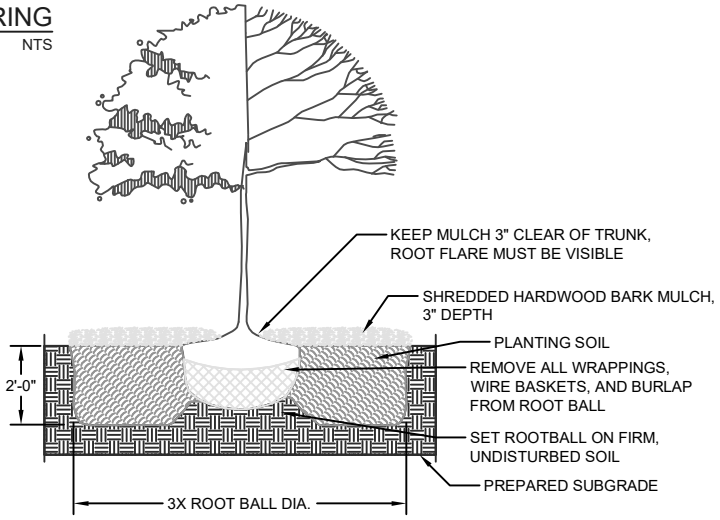
NOTES:

1. THE PAVING CONTRACTOR SHALL ADJUST CASTINGS FROM 3/8" TO 1/2" BELOW FINISHED GRADE, AND WITH THE APPROPRIATE DESIGN SLOPE, BEFORE PAVING SURFACE COURSE.



CONIFEROUS TREE PLANTING WITH MULCH RING

NTS



DECIDUOUS TREE PLANTING WITH MULCH RING

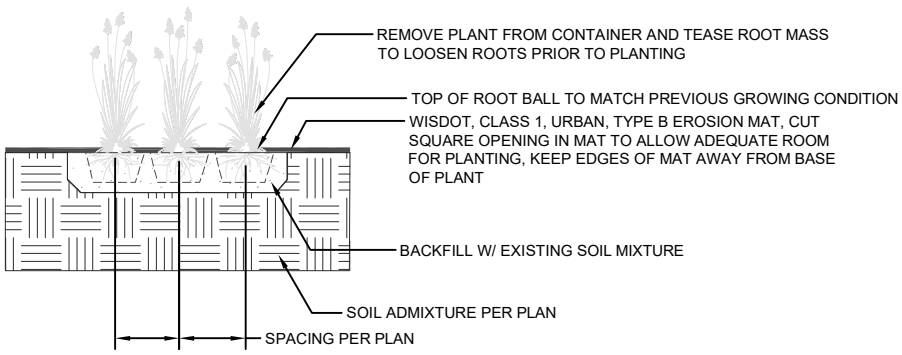
NTS

NOTES:
THOROUGHLY WATER ALL CONTAINER GROWN PERENNIALS PRIOR TO PLANTING, ENSURE ROOT BALL IS EVENLY MOIST AT TIME OF PLANTING

DO NOT PRUNE BEFORE ACCEPTANCE

PRUNE TO REMOVE ONLY DEAD OR DAMAGED LEAVES OR STEMS. RETAIN NATURAL FORM

PERENNIALS OF SAME SPECIES TO MATCH IN GROWTH AND UNIFORMITY



CONTAINER PERENNIAL PLANTINGS

NTS