Addendum #6

Project #2767A

Brown County Port Development Project

Port & Resource Recovery

November 3, 2025

Request for Bid

See original specification packet for addresses

THIS ADDENDUM IS ISSUED TO MODIFY, EXPLAIN OR CORRECT THE ORIGINAL DRAWINGS AND SPECIFICATIONS AND IS HEREBY MADE PART OF THE CONTRACT DOCUMENTS. THIS ADDENDUM MUST BE ACKNOWLEDGED ON THE ADDENDUM RECEIPT SCHEDULE, WHICH WAS INCLUDED IN THE ORIGINAL DOCUMENT PACKAGE.

Vendors are required to read entire addendum to determine requirements affecting their contract.

Addendum #6

This addendum is for the following:

- To replace the Technical Specifications that were posted as addendum #5. Addendum #5 specs were the 90% specs. These are the 100% specs.

BID DUE DATE

11/18/25 BY 11:00 A.M. CST

GEI Consultants

Consulting
Engineers and
Scientists

Brown County Port Development Project

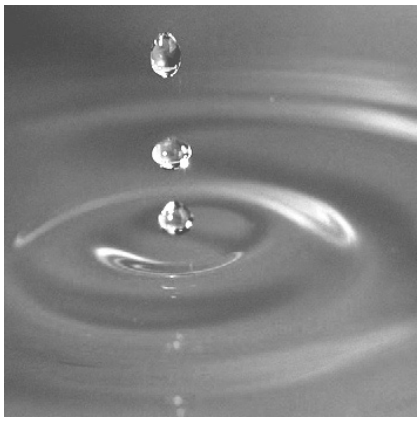
Technical Specifications

Green Bay, Wisconsin

Submitted to:
Brown County Port & Resource Recovery
2561 S. Broadway
Green Bay, Wisconsin 54304

Submitted by:
GEI Consultants, Inc.
3159 Voyager Drive
Green Bay, Wisconsin 54311
920.455.8200

October 2025
Project No. 2201593



Karl M. Krueger, P.E.
Senior Engineer

Mark J. Vannieuwenhoven, P.E., PMP
Senior Consultant

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INVITATION TO BID

1.1 PROJECT INFORMATION

A. Notice to Bidders: Bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.

B. Project Identification: Brown County Port Development Project – Project #2767A

1. Project Location: 1530 Bylsby Avenue, Green Bay, Wisconsin

C. Owner: Brown County Port & Resource Recovery

1. Owner's Representative: Mr. Dean Haen

D. Engineer: GEI Consultants, Inc.

1. Project Manager: Mr. Mark Vannieuwenhoven

E. Contractor/Installer: To be named

F. Project Description: The Port of Green Bay Development Project includes the clearing and redevelopment of the former Pulliam Power Plant for new Port operations. The proposed project will develop a multi-use port facility capable of handling a range of dry cargoes. Project elements include installation of 2,035 feet of dockwall along the Fox River bulkhead line, dredging of 215,000 CY of material, placement of riprap on the north facing bay of Green Bay shoreline, placement of 136,000 CY of fill between land and the bulkhead line/dockwall, filling of a cooling channel, site regrading and resurfacing, construction of stormwater management infrastructure, and installation of vessel fendering and mooring systems.

G. The scale of the project is defined by the following approximate quantities:

- Sheetpile Dockwall Installation = 2,035 lineal feet
- Organic Sediment Dredging = 113,380 cubic yards
- Dredging of Clay = 101,530 cubic yards
- Marine Stone Fill = 136,000 cubic yards
- Aggregate Backfill = 30,000 cubic yards
- Engineered Fill Across Site = 170,000 cubic yards
- Asphalt Pavement = 8-12 acres
- Breaker Run and Dense Aggregate Base = 183,400 tons
- Clay Pond Liner = 10,340 cubic yards
- Site Utilities = Electrical, water, and sanitary lines

1.2 KEY DATES AND ACTIVITIES

Activity	Date
Bid Advertisement 1 – 90% Design	September 23, 2025
Bid Advertisement 1 – 90% Design	September 30, 2025
Submit Intent to Bid through email	September 30, 2025
Prebid meeting and overview tour	October 2, 2025 @ 1:00 PM
Alternative Technical Concepts Due	October 9, 2025
Bid Addendum Advertisement 1 – 100% Design	October 23, 2025
Bid Addendum Advertisement 2 – 100% Design	October 30, 2025
Questions Due	November 5, 2025
Answers to Questions	November 10, 2025
Bid Due via Email	November 18, 2025
Planning, Development & Transportation Agenda	November 25, 2025
Harbor Commission Meeting	December 1, 2025
PD&T Meeting	December 2, 2025
County Board Meeting	December 17, 2025
Intent to Award	December 18, 2025
Contract Negotiation	January 2026
Project Completion	November 15, 2027

** Dates subject to change

1.3 DOCUMENTS WITHIN THIS INVITATION TO BID

	Document Name	Document Description	Action
1.	Invitation to Bid	Project bid information	Review
2.	100% Design Specifications	Technical Specifications	Bidder to Submit all required information
3.	100% Bid Drawings	Issued for Bid Drawings	Review
4.	Terms and Conditions	Terms and conditions	Acknowledge acceptance / Red-line
5.	Bid Form	Bid Form	Bidder to Submit completed form
6.	Work Plan	Summary of Work (within Technical Specifications)	Review

7.	Supplier Subcontractor Business Plan	Subcontracting Plan for all subcontractors	Bidder to Submit completed form
8.	Detailed Invoice Template	Detailed Invoice Template	Review
9.	Project Change Request Form	Project scope, cost and/or schedule changes are captured on this form	Review

END OF SECTION

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GENERAL CONTRACTOR

General Contractor:

Address:

Telephone:

% Contract Amount:

Proposed Superintendent Name:

References: 1)

2)

3)

(Please Append Resume)

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SUBCONTRACTORS

Proposed Subcontractor: _____

Address: _____

Telephone: _____

% Contract Amount: _____

Proposed Subcontractor: _____

Address: _____

Telephone: _____

% Contract Amount: _____

Proposed Subcontractor: _____

Address: _____

Telephone: _____

% Contract Amount: _____

Proposed Subcontractor: _____

Address: _____

Telephone: _____

% Contract Amount: _____

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DESCRIPTION OF PROJECT APPROACH

The Bidder shall provide a detailed description of the proposed construction approach. Description should include sequencing of work, soil stockpiling and material staging, dredging and material handling procedures, proposed equipment to be used, dewatering and water treatment strategy, and operational staffing.

(Please Append Additional Sheets If Necessary)

Contractor's Application for Payment

Owner:	Brown County Port & Resource Recovery	**Owner's Project No.:**	2767A
Engineer:	GEI Consultants, Inc.	**Engineer's Project No.:**	2201593
Contractor:		**Contractor's Project No.:**	
Project:	Brown County Port Development Project		
Contract:			
Application No.:		**Application Date:**	
Application Period:	**From**	**to**	

1. Original Contract Price		$ -
2. Net change by Change Orders		$ -
3. Current Contract Price (Line 1 + Line 2)		$ -
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)		$ -
5. Retainage		
a. ____ X $ - Work Completed =	$ -	
b. ____ X $ - Stored Materials =	$ -	
c. Total Retainage (Line 5.a + Line 5.b)		$ -
6. Amount eligible to date (Line 4 - Line 5.c)		$ -
7. Less previous payments (Line 6 from prior application)		
8. Amount due this application		$ -
9. Balance to finish, including retainage (Line 3 - Line 4 + Line 5.c)		$ -

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor:

Signature: **Date:**

Recommended by Engineer		**Approved by Owner**	
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	
Approved by Funding Agency			
By:		**By:**	
Title:		**Title:**	
Date:		**Date:**	

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CHANGE ORDER

CHANGE ORDER NO.: _____

Owner:	Brown County Port & Resource Recovery Dept.	Owner's Project No.:	2767A
Engineer:	GEI Consultants, Inc.	Engineer's Project No.:	2201593
Contractor:		Contractor's Project No.:	
Project:	Brown County Port Development Project		
Contract Name:			
Date Issued:		Effective Date of Change Order:	

The Contract is modified as follows upon execution of this Change Order:

Description:

Attachments:

Change in Contract Price	**Change in Contract Times [note changes in Milestones if applicable]**
Original Contract Price: $ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. ___: $ _____	**[Increase] [Decrease]** from previously approved Change Orders No.1 to No. ___: Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: $ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: $ _____	**[Increase] [Decrease]** this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: $ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

	Recommended by Engineer (if required)	Accepted by Contractor
By:	_____	_____
Title:	_____	_____
Date:	_____	_____
	Authorized by Owner	Approved by Funding Agency (if applicable)
By:	_____	_____
Title:	_____	_____
Date:	_____	_____

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HEALTH AND SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. The WORK required under this section includes furnishing all labor, materials, and equipment, and performing all operations required to conform to all Federal, State, and local health and safety requirements during the performance of the WORK.

1.02 SUBMITTALS

A. Prior to mobilization, submit the CONTRACTOR'S Health and Safety Plan, and documentation of OSHA training as described in Section 3.1 – WORKER QUALIFICATIONS of this Specification.

1.03 CONTRACTOR'S RESPONSIBILITY FOR HEALTH AND SAFETY

A. Comply with any and all applicable state, federal, and local ordinances, laws, and regulations.

B. The CONTRACTOR is responsible for the Health and Safety their employees, its SUBCONTRACTORS, suppliers, agents, inspectors, visitors, the general public, and any Others associated with, or interacting with CONTRACTOR who provides labor, goods, or other services on the Site.

C. The CONTRACTOR is responsible for emergency response planning and notification and for actual response to all emergencies that may occur during the course of the WORK, including emergencies that may occur when the CONTRACTOR is not present at the Site.

D. Designate a Site Safety and Health Officer (SSHO).

E. The SSHO shall enforce the health and safety requirements for all CONTRACTOR personnel on-site at all times. The SSHO shall ensure that all CONTRACTOR personnel, SUBCONTRACTOR personnel, and CONTRACTOR visitors follow the CONTRACTOR'S site Health and Safety Plan (HASP), including wearing the designated level of Personal Protective Equipment (PPE). If the SSHO elects to require a higher level of protection, the extra costs associated with such higher level shall be borne by CONTRACTOR, unless such extra costs are approved in advance in writing by the OWNER.

F. Prior to mobilization and continually through the duration of the WORK, the SSHO shall inspect the Site and document area-specific and worker-specific protection requirements.

G. After mobilization, the SSHO shall monitor WORK activities and document the need for additional worker protection, as required, based on the WORK being performed and action levels specified in the CONTRACTOR HASP.

H. The SSHO shall verify that all activities are performed in accordance with the HASP and all federal, state, local, and Health and Safety standards, Laws and Regulations, and guidelines.

I. In the event of a health or safety risk, as determined by the SSHO, other CONTRACTOR personnel, or by the OWNER, stop WORK until a method for handling the risk has been determined and implemented. Report any health or safety risk resulting in a WORK stoppage to the OWNER.

J. The CONTRACTOR is responsible for implementing a behavior-based safety process and providing site training, observation, and feedback for CONTRACTOR personnel employed at the Site.

1.04 CONTRACTOR'S HEALTH AND SAFETY PLAN

A. Prepare and submit a Site-specific Health and Safety Plan (HASP) to the OWNER prior to the start of the WORK. Follow all applicable local, state, and federal Health and Safety standards, Laws and Regulations, and guidelines implemented through, but not limited to, the OSHA, NIOSH, USACE, and USEPA. Where these references are in conflict, follow the more stringent requirement. At a minimum, address the following topics in the CONTRACTOR HASP:

1. Names of key personnel and alternates responsible for Health and Safety, including a CONTRACTOR Health and Safety Representative and SSHO.

2. Documentation of employee and SUBCONTRACTOR training and medical certifications required by 29 CFR 1910.120, as described in Part 3 of this Section.

3. PPE to be used for each of the tasks and operations being conducted, as required by the PPE program in 29 CFR 1910.120, 29 CFR 1910 Subpart I, 29 CFR 1926.28, and 29 CFR 1926 Subpart EA list of Health and Safety and emergency equipment available on the Site.

4. A description of engineering controls used to reduce the hazards of equipment operation.

5. Heat stress program.

6. Cold stress program.

7. Lockout/Tagout procedures where the sudden start up or release of stored energy could cause injury to personnel.

1.05 NOTIFICATIONS

A. Notify the OWNER as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as well as any report of injury, illness, or any property damage.

B. Notify the OWNER of load handling equipment or rigging mishaps, as soon as practical but not more than 4 hours after mishap.

C. The CONTRACTOR is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies.

D. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

E. Immediately notify the OWNER of any hazard the CONTRACTOR discovers or observes on the Site, and the corrective measures planned or taken to eliminate or minimize the hazard Within notification include CONTRACTOR name; contract title; type of contract; name of location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until all possible OWNER investigations are conducted. Assist and cooperate fully with the OWNER investigation(s) of any mishap.

PART 2 PRODUCTS

2.01 EQUIPMENT AND FACILITIES

A. Provide all equipment, temporary facilities, and controls required to perform the WORK safely in accordance with all applicable laws and regulations and the CONTRACTOR'S HASP.

2.02 PERSONAL PROTECTIVE EQUIPMENT

A. The appropriate level of PPE is to be determined by the CONTRACTOR for the specific tasks as described in the CONTRACTOR'S HASP. If hazards are identified that require a level of protection greater than Level D (defined in paragraph C below), WORK shall be suspended, and the OWNER notified.

B. Furnish and maintain materials and equipment for the health and safety of CONTRACTOR employees, SUBCONTRACTORS, Suppliers, and visitor personnel. Provide all required first aid equipment, tools, monitoring equipment, PPE, and ancillary equipment required to comply with the CONTRACTOR'S HASP.

C. Level D protection will be required at all times for all personnel and visitors on the Site. Level D PPE consists of:

1. Hard hat.

2. Steel-toed boots.

3. Safety glasses with permanent side shields.

4. Work clothes (long pants, shirts with sleeves).

5. Work gloves.

6. Hearing protection (as needed to prevent exposure exceeding 85 dB level).

7. High visibility reflective safety vests, and;

8. U.S. Coast Guard approved Personal Flotation Devices for personnel working on or near the water.

PART 3 EXECUTION

3.01 WORKER QUALIFICATIONS

A. Provide the following training to workers.

1. Current cardiopulmonary resuscitation (CPR) and first aid certification for at least two workers assigned to WORK on the Site.

2. OSHA 40 Hour training course.

3. For any worker who is assigned the role of a “competent person,” provide documentation of sufficient and relevant training and experience to perform the assigned duties and responsibilities of that role. As defined in 29 CFR 1926.31, the competent person shall be “one who is capable of identifying existing and predictable hazards, and who has authority to take prompt corrective measures to eliminate them.” Relevant training and experience shall be in the same type of project activities included in the WORK under this Contract.

3.02 WORK PLANNING AND MEETINGS

A. Conduct a daily health and safety meeting, prior to beginning WORK for that day, to address health and safety issues, changing conditions, activities, and personnel. All CONTRACTOR and SUBCONTRACTOR employees working on the SITE on that day must attend the meeting. Document all meetings and have attendees sign a form acknowledging their presence at the meeting. Include as part of the daily meeting, an evaluation of the WORK to be conducted and the hazards associated with the WORK.

B. CONTRACTOR personnel who are not in attendance for the daily Health and Safety must be briefed on the meeting notes prior to commencing any work-related activities.

C. Hold and document additional safety meetings at the start of each major task, and whenever site conditions change such that it could potentially affect worker safety.

3.03 MONITORING

A. Perform heat exposure and cold exposure monitoring activities as required by weather conditions.

END OF SECTION

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SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work covered by CONTRACT DOCUMENTS

B. Work by OWNER and others.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The work to be done under this CONTRACT DOCUMENT includes, but is not necessarily limited to, furnishing all labor, tools, equipment, materials, supplies, supervision, and administration for performing the following work:

1. Mobilization of equipment, materials, and personnel.

2. General Conditions and Project Administration - CONTRACTOR's project management, coordination with OWNER and ENGINEER, meetings, CONTRACTOR's quality control testing and surveying, and general conditions including but not limited to: phone, fax, computer, utilities, water, toilets, and waste disposal.

3. Site preparation, Clearing, and Demolition – Preparation of work area, including: tree clearing; fence removal; demolition and disposal of existing structures, topsoil stripping and stockpiling; supplying, installing, and maintaining erosion control measures until construction is completed; construction and maintenance of temporary access roads; dust control and dewatering of work areas until completion of construction; and protection of existing railroad tracks and site utilities.

4. Bathymetric Surveys – Completion of pre-dredging, post-organic material dredging, and post-dredging surveys for verification of work and calculation of quantities.

5. Install, maintain, and remove turbidity controls for in-water work.

6. Sheetpile Dockwall Installation – Installation of sheetpile dockwall along the approved bulkhead line, including deadman support wall and sheetpile wall across CB60 sediment cap. OWNER may directly purchase the steel sheet piling if a financial benefit is determined. If OWNER does purchase sheet piling, Contractor shall be responsible for accuracy of order and the return of extra material for a credit to Brown County.

7. CB60 Sheetpile Support Wall – Installation of sheetpile wall to support toe of revetment berm across CB60 sediment cap. OWNER may directly purchase the steel sheet piling if a financial benefit is determined. If OWNER does purchase sheet piling, Contractor shall be responsible for accuracy of order for all accurate order and the return of extra material for a credit to Brown County.

8. Mooring Bollards – Supply and installation of 17 mooring bollards along dockwall as indicated on Drawings.

9. Timber Fenders – Supply and installation of timber fender rails along top and front side of the dockwall as indicated on Drawings.

10. Dredging of Organic Sediments – Dredging of soft organic sediments from upper portion of the Fox River and Bay of Green Bay and hauling and placement of sediments within the Bay Port Dredged Material Re-Handling Facility.

11. Dredging of Clay – Dredging of native clay within the Fox River and Bay of Green Bay to be reused to the extent possible for site filling and grading.

12. Marine Stone Fill Behind Dockwall – Supply and placement of aggregate fill as backfill behind dockwall.

13. Marine Stone Fill in Bay - Supply and placement of aggregate fill below the water line within the Bay north of the site behind the site bulkhead line.

14. Marine Stone Fill in Discharge Channel - Supply and placement of aggregate fill below the water line within the former discharge channel.

15. Marine Stone Fill in Boat Slip - Supply and placement of aggregate fill below the water line within the former boat slip. This fill will require placement in controlled lifts across the boat slip, by conveyor or other equivalent means. This filling will also be monitored by OWNER and ENGINEER using vibrating wire piezometers to monitor pore water pressure within the soft sediment. Filling may need to be slowed or temporarily stopped to allow pore pressures to dissipate and prevent mudwaving.

16. Site Structural Fill (Clay Reused from Dredging) – Conditioning, placement, and compaction of clay fill for raising site grades and filling the boat slip, bay, and discharge channel above the water line.

17. 3” Breaker Run – Supply and placement of breaker run for support under the aggregate base course.

18. 1 ¼” Aggregate Base Course – Supply and placement of aggregate base course for final surface of the site and below asphalt pad.

19. Revetment Berm Riprap – Supply and placement of extra heavy riprap for face of northern revetment berm along the Bay.

20. Remove Existing Topsoil Stockpile - Removal of existing 3,350 cubic yards topsoil stockpile from the site.

21. Excavation of Detention Ponds – Excavation of two detention ponds to grades indicated on Drawings. Reuse of material for site fill.

22. Detention Ponds Clay Liner – Reuse of dredged clay for installation of a 2-foot-thick compacted clay liner within each of the two detention ponds.

23. Detention Pond Outlet Structures – Supply and installation of manhole outlet structures for the two detention ponds.

24. West Side Concrete Lined Ditch – Grading and concrete lining for a stormwater diversion ditch along the western edge of the site in accordance with the Drawings.

25. 24-inch Diameter Concrete Stormwater Pipe – Supply and installation of concrete pipe for outlet of detention ponds and western stormwater ditch.

26. Artesian Well Drain Tile – Supply and installation of 500 feet of perforated piping and aggregate backfill for collection of water from artesian well. Pipe shall be 6" diameter, perforated. HDPE SDR 17 pipe and discharge to western ditch as indicated on the Drawings.

27. Electrical Distribution and Transformers – Installation of electrical service from Bylsby Avenue to disconnect locations on the northern and southern portions of the site. Installation of metering station near Truck Scale A.

28. Asphalt Pad – Installation of an 38,720-square yard asphalt pad on northern portion of the site.

29. Truck Scale – Supply and install a truck scale as indicated on the Drawings. Truck scale shall be Rice Lake Survivor Steel Deck Truck Scale, or equivalent.

30. Flint Hills Resources Dockwall Repair - Investigate and repair damaged section of Flint Hills Resources dockwall. For purpose of bid, assume investigation and probable repair using grout bags behind wall to stop gravel loss.

31. Post-Construction Site Restoration - final site restoration, including trash removal, repair of access roadways, seeding of disturbed vegetated areas, and removal of temporary utilities and facilities.

32. Demobilization of equipment, excess materials, and personnel.

BID SCHEDULE B - OPTIONAL BID ITEMS

B1. Crane Pad (Optional Bid Item B1) – Install up to two crane pads on the site near the dockwall as indicated on the Drawings, including HP12x53 piles to bedrock and a 45-inch-thick reinforced concrete slab. Price per each.

B2. Additional Scale (Optional Bid Item B2) – Install a second scale equivalent to the scale provided under Bid Item 23.

B3. Sanitary Sewer Installation (Optional Bid Item B3) – Install approximately 1,240 feet of 8-inch diameter PVC sanitary sewer from Bylsby Avenue and terminating in a manhole at the eastern end of the access road.

B4. Water Line Installation (Optional Bid Item B4) – Install approximately 1,200 feet of 6-inch diameter PVC water line from Bylsby Avenue and terminating in a manhole at the eastern end of the access road.

B5. Gas Utility Installation (Optional Bid Item B5) – Install approximately 1,170 feet of natural gas line from Bylsby Avenue and terminating in a junction box at the eastern end of the access road.

B6. Security Lighting and Poles (Optional Bid Item B6) – Price to supply and install 10 security lights on poles around the perimeter of the site. Electrical feed is assumed to be 360 feet per pole.

B7. Access Road Paving (Optional Bid Item B7) – Price to pave main access road from Bylsby Avenue to south edge of northern asphalt pad, 5,750 square yards.

B8. Asphalt Pad Additional 4 Acres (Optional Bid Item B8) – Price to pave an additional 4 aces of asphalt storage pad area, bringing the total pad area to 12 acres.

B. Project Schedule:

1. The project is required to be completed by November 15, 2027.

C. The summary of work described above is an overall summary of the work to be performed and the responsibilities of the CONTRACTOR. It does not supersede the specific requirements of the other CONTRACT DOCUMENTS.

D. These specifications are in many instances written in imperative and streamlined form. This imperative language is directed to the CONTRACTOR, unless specifically noted otherwise.

1.03 WORK BY OTHERS

A. The work to be performed by OWNER or OWNER's designated representatives is as follows:

1. General observation of work for conformance to specifications.

2. Construction documentation and construction quality assurance testing including material and soil testing except where specific submittals are required.

1.04 SEQUENCE OF WORK

A. The work is to be coordinated with any subcontractors and with current adjacent WPS and GLC operations so as not to interfere with these activities.

PART 2 - PRODUCTS

A. Not Used.

PART 3 - EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 15 00

GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Definitions and Technical Specification Explanations.

B. Responsibilities.

C. Permits and Fees.

D. Purchase Order Releases/Changes in Work Scope.

1.02 DEFINITIONS AND TECHNICAL SPECIFICATION EXPLANATIONS

A. ADDENDUM - Written or graphic instrument issued prior to the bid due date, which clarifies, corrects, or changes the bidding documents of the CONTRACT DOCUMENT.

B. OWNER – Brown County Port & Resource Recovery.

C. PROJECT MANAGER - The authorized representative of the OWNER, named in the Specification Data Sheet, who shall perform OWNER's administrative and management responsibilities so as to complete the project to the satisfaction of the OWNER.

D. ENGINEER - The Design Engineer, retained and authorized representative of the OWNER, named in the Specification Data Sheet or a designated alternate, who shall perform engineering support responsibilities so as to complete the project to the satisfaction of the OWNER.

E. CONSTRUCTION QUALITY ASSURANCE TECHNICIAN (CQA TECHNICIAN) - The ENGINEER's designated representative, who shall perform inspection and testing responsibilities, so as to confirm the work is completed to applicable standards.

F. CONTRACTOR – Construction Contractor and associated Subcontractors awarded contract to perform WORK described by CONTRACT DOCUMENT.

G. WORK - Complete construction services including labor, materials, equipment, services, supervision, and administration provided by the CONTRACTOR, or any portion thereof as implied by the context of the specification section in which the term is used.

H. CONSTRUCTION MANAGER – The ENGINEER's on-site representative observing, documenting, and coordinating the performance of the WORK, interfacing with the ENGINEER, OWNER, and regulatory agencies; and authorizing quantities for CONTRACTOR invoice submittals.

I. CONTRACT DOCUMENT - Document which includes the following: Agreement, General Conditions, Supplementary Conditions, Bid, Construction Technical Specifications, DRAWINGS, and Addenda.

I. OTHERS - Not Used.

J. In the Technical Specifications where the word “CONTRACTOR” occurs, it shall imply contractor, subcontractor, erector, fabricator, or material supplier for that particular section of the specifications.

K. In the Technical Specifications, omitted phases or words, such as “The CONTRACTOR shall”, “in conformity with”, “as noted on DRAWINGS”, “according to the plans”, “the”, “all”, are intentional and shall be supplied by inference.

L. Reference to standard specifications or MANUFACTURER’s directions shall mean the latest edition thereof at date of the Technical Specifications, unless otherwise noted.

M. Project Commencement - Defined as prior to CONTRACTOR mobilizing to site.

N. Field Directive - Clarifications and changes to Technical Specifications and Project DRAWINGS will be made by ENGINEER or PROJECT MANAGER in a Field Directive.

O. Substantial Completion - Point in time when all components are installed.

P. Project Completion - Point in time when all WORK is completed in accordance with Technical Specifications and proper submittals completed and verified.

1.03 RESPONSIBILITIES

A. CONTRACTOR, subcontractor, or material supplier shall become familiar with all conditions relating to execution of the WORK. Neglect of this requirement will not be accepted as course for additional compensation or time.

B. CONTRACTOR shall be responsible for scheduling operations to coordinate WORK of his forces, subcontractors, and suppliers so as to meet the project schedule and completion date.

C. CONTRACTOR shall obtain complete data at the site and inspect areas scheduled to receive WORK before proceeding with such WORK; shall be solely responsible for obtaining and verifying the accuracy of all measurements and layout of WORK; and shall make good, errors or defects due to faulty measurements taken, information obtained, layout or due to failure to report discrepancies.

D. CONTRACTOR shall notify ENGINEER and PROJECT MANAGER, in writing, in case of discrepancies between existing WORK and DRAWINGS or defects in such surfaces that are to receive WORK. Starting of WORK or failure to notify ENGINEER and PROJECT MANAGER of such discrepancies and/or defects shall constitute CONTRACTOR’s acceptance of same. Removal and replacement of WORK applied to defective surfaces, in order to correct defects, shall be done at expense of CONTRACTOR who applied WORK to defective surfaces.

E. PROJECT MANAGER shall be responsible for scheduling performance of WORK by OWNER or others.

F. ENGINEER shall respond in writing to any written notifications made by the CONTRACTOR regarding discrepancies between existing WORK and DRAWINGS or defects in surfaces or areas that are to receive WORK.

G. CQA TECHNICIAN shall be responsible to maintain daily contact with CONTRACTOR during progress of WORK and to facilitate communication between CONTRACTOR, PROJECT MANAGER, and ENGINEER.

1.04 PERMITS AND FEES

A. OWNER shall secure project permits with the assistance of ENGINEER and CONTRACTOR. Copies of the permits shall be provided to the CONTRACTOR awarded the Contract. CONTRACTOR shall comply with applicable permit provisions and hold necessary certifications if deemed applicable by the regulatory agency or OWNER for permit compliance.

B. OWNER shall be responsible for the payment of all permit-related fees for permits and approvals OWNER or ENGINEER is responsible to obtain.

1.05 GENERAL AND SITE-SPECIFIC REQUIREMENTS

A. Fire Protection and Emergencies

1. CONTRACTOR shall furnish and maintain a suitable type and amount of portable fire extinguishers or carts.

2. CONTRACTOR shall abide by the OWNER's emergency notification and operating practices for emergency situations. These practices will be discussed at the pre-construction meeting.

B. Field Offices and Structures

1. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access.

2. Field Offices: provide insulated, weathertight temporary offices of sufficient size to accommodate CONTRACTOR, ENGINEER, and OWNER personnel at the Project site. Provide a room of not less than 240 sq. feet (22.5 sq. m) for project meetings. Maintain offices clean and orderly. Furnish and equip offices for use.

3. CONTRACTOR shall provide necessary temporary sheds or other storage facilities to accommodate CONTRACTOR's supply and storage needs.

C. Telephone Service and Radios

1. CONTRACTOR shall provide, maintain, and pay for telephone service to the site from project start to completion. Possession by the CONTRACTOR's designated on-site superintendent or foreman of a cellular phone is acceptable to meet this requirement.

2. If used by the CONTRACTOR during the performance of the work, provide two-way radios with spare batteries for use by the ENGNIEER and OWNER during the performance of the WORK. The radio provided to the OWNER must be able to receive and send on all frequencies that will be used by the CONTRACTOR during the performance of the WORK.

D. Temporary Utilities

1. CONTRACTOR shall arrange for temporary electrical service as needed.

2. CONTRACTOR shall furnish drinking water as required.

E. Sanitary Facilities

1. Provide temporary sanitary toilet facilities conforming to state and local health and sanitation regulations in sufficient number for use by CONTRACTOR's and Subcontractor's employees.

2. Maintain sanitary conditions and properly supply with toilet paper.

1.06 TRANSPORT AND HANDLING

A. Transport and handle products in accordance with MANUFACTURER's instructions.

B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.07 EQUIPMENT STORAGE AND PROTECTION

A. CONTRACTOR shall park equipment and store materials only in those areas designated on the DRAWINGS, specified in the CONTRACT DOCUMENT, or as directed by the PROJECT MANAGER.

B. Store and protect products in accordance with MANUFACTURER's instruction, with seals and labels intact and legible.

C. Store sensitive products in weather-tight, climate-controlled enclosures.

D. For exterior storage of fabricated products, place on sloped supports aboveground.

E. Provide off-site storage and protection when site does not provide adequate on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Arrange storage of products to permit access for observation. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

I. Areas disturbed by the CONTRACTOR shall be restored to their original condition upon project completion.

1.08 PROTECTION OF ENVIRONMENT AND TEMPORARY CONTROLS

A. Protection of Storm Sewers

1. Prevent construction material, pavement, concrete, earth, or other debris from entering existing storm sewer or sewer structures.

B. Protection of Waterways

1. Observe rules and regulations of the State of Wisconsin and agencies of U.S. government prohibiting pollution of lakes, streams, rivers, or wetlands by spilling or dumping of refuse, rubbish, dredge material, soil, or debris.

2. Disposal of materials into waters of state must conform with requirements of the Wisconsin Department of Natural Resources and U.S. Army Corps of Engineers. Permits, if necessary, will be obtained by OWNER and provided to CONTRACTOR(S) for posting on job site.

3. Comply with the project specific WPDES Permit for water treatment and discharge during all phases of the project.

C. Protection of Air Quality

1. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment and encourage shutdown of motorized equipment not in use.

2. If temporary heating devices are necessary for protection of Work, they shall not cause air pollution.

3. Dust control is the responsibility of the CONTRACTOR. CONTRACTOR shall conduct operations and maintain the site to minimize the creation and dispersion of dust.

E. Use of Chemicals

1. Submit SDS for all chemicals and obtain OWNER’S approval prior to bringing chemicals on site.

2. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, shall be approved by U.S. EPA or U.S. Department of Agriculture or any other applicable regulatory agency.

3. Use and disposal of chemicals and residues shall comply with manufacturer’s instructions.

F. Noise Control

1. Implement and comply with the Noise Management and Vibration Monitoring Plans.

2. Conduct operations to cause least annoyance to residents in vicinity of WORK and comply with applicable local ordinances.

3. Construction equipment shall be in good working order and equipped with high-performance mufflers.

4. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.

5. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.

6. Conduct hauling operations so as equipment causes a minimum of noise and dust.

G. Dust and Mud Controls

1. CONTRACTOR shall conduct operations and maintain the site to minimize the creation and dispersion of dust and mud.

2. Take special care in providing and maintaining temporary site roadways, OWNER's existing roads, public roads, borrow area, and stockpiles used during construction operations in clean, dust-free condition.

3. Comply with environmental regulations for dust control and directions of OWNER. If CONTRACTOR's dust control measures are considered inadequate by OWNER, OWNER will require CONTRACTOR to take additional dust control measures.

4. CONTRACTOR shall control mud and tracking of mud both on and off the site by providing stone and grade and fill areas to prevent tracking.

H. Fuels and Lubricants

1. CONTRACTOR to comply with all local, state, and federal regulations concerning the transportation and storage of fuels and lubricants.

2. CONTRACTOR shall prepare and implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan for the fueling and maintenance of all construction equipment.

3. A fuel storage and equipment refueling area shall be designated by OWNER. The CONTRACTOR shall be and remain liable for compliance by its employees, agents, and subcontractors that all refueling take place in the designated area. Containment requirements shall be submitted by CONTRACTOR for approval in writing by OWNER.

4. All spills or leakage shall be reported to OWNER and CONTRACTOR shall be responsible for cleanup and proper disposal, as required.

5. OWNER reserves the right to order damaged or leaking equipment off-site.

I. Barriers and Protection of Installed Work

1. CONTRACTOR shall protect installed WORK and provide special protection where specified in the Technical Specifications.

2. CONTRACTOR shall provide barriers to prevent unauthorized entry to construction and staging areas as necessary and shall protect existing facilities and adjacent properties from damage from construction operations.

J. Progress Cleaning

1. CONTRACTOR shall maintain areas free of waste materials, debris, and rubbish. The site shall be maintained in a clean and orderly condition.

2. CONTRACTOR shall remove waste materials, debris, and rubbish from the site weekly and properly dispose offsite at CONTRACTOR'S expense. As an alternative, contractor can supply and pay for a commercial dumpster and pickup.

1.09 UTILITY PROTECTION

1. The location of existing underground and aboveground utilities, and structures and obstructions shown on the DRAWINGS are approximate only. Additional underground structures and obstructions may also exist. Neither the OWNER nor the ENGINEER makes any warranty, expressed or implied, as to the accuracy or completeness of utilities or facilities shown on the DRAWINGS. CONTRACTOR shall determine in his own way the obstructions and difficulties to be encountered in the execution of the work under this Contract. CONTRACTOR shall take all measures necessary to protect the underground and aboveground utilities and structures from damage during the performance of his WORK. Any damage to the underground and aboveground utilities as a result of the CONTRACTOR's WORK shall be repaired at no cost to the OWNER or ENGINEER.

2. The CONTRACTOR is solely responsible for any and all required notifications to utility companies prior to commencing the WORK, and for response to any emergencies that may arise during the WORK. Certain active and inactive utilities may currently be present at the Site. To the extent they are known, approximate locations area shown on the Design Drawings. The exact location and type of utility is to be determined by the CONTRACTOR.

3. Protection of Utilities includes the following:

a. Comply with the requirements of all applicable utility protection laws or regulations.

b. Contact and cooperate with utility companies to locate all utilities (including pipelines, cables, and other structures) on the Site prior to beginning the WORK.

c. Protect all utilities from damage during construction, unless otherwise indicated to be removed or abandoned. If damaged, repair the utilities as required by the utility's owner at the CONTRACTOR'S expense.

d. If a utility is encountered that is not shown on the CONTRACT DOCUMENTS, or otherwise not made known to the CONTRACTOR prior to beginning the WORK, promptly take the necessary steps to assure that the utility is not damaged and notify the ENGINEER and OWNER of the presence of the utility. The ENGINEER and OWNER will review the conditions and determine the

extent, if any, to which a change is required in the CONTRACT DOCUMENTS to reflect and document the consequences of the existence of the utility.

e. Immediately notify the ENGINEER and OWNER of any incident involving a utility.

4. If a utility, either known or unknown, is damaged during the performance of the WORK submit a written description of the incident to the ENGINEER and OWNER within 48 hours of the incident.

1.10 UNFORSEEN PHYSICAL CONDITIONS

A. Discovery of Unforeseen Physical Conditions

1. Promptly notify OWNER and ENGINEER in writing of any subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENT.

2. ENGINEER will promptly investigate those conditions and if ENGINEER finds that there are subsurface or latent physical conditions which differ materially from those intended in the CONTRACT DOCUMENT, and which could not reasonably have been anticipated by CONTRACTOR, and if the OWNER concurs with the ENGINEER's finding, a Change Order shall be issued incorporating the necessary revisions.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Measurement and payment criteria applicable to the WORK.

B. Defect assessment and non-payment for rejected WORK.

1.02 AUTHORITY AND PAYMENT

A. Measurement methods for the WORK are delineated in this section.

B. All elements of WORK required to complete the specified WORK in the CONTRACT DOCUMENTS will be paid for under the lump-sum and unit prices price stated in the CONTRACT. The lump sum or unit price will include compensation for all labor, equipment, materials, field engineering, construction surveying, quality control, and incidental items required to complete the WORK as specified.

C. The ENGINEER will take the appropriate measurements for excavation and grading and compute the quantities of materials accordingly.

D. The OWNER shall make payments to the CONTRACTOR in accordance with the terms specified in the Agreement and CONTRACT.

E. Percentages of progress on payment of the lump sum shall be coordinated between the CONTRACTOR and ENGINEER at the end of the billing period. Invoices shall be rendered on the basis of the agreed upon percentage.

F. CONTRACTOR shall prepare and submit invoices in accordance with OWNER'S invoice preparation guidelines.

G. OWNER shall release progress payments based on recommendations of ENGINEER. Payment of invoices shall be withheld if CONTRACTOR has not transmitted all required submittals, survey data, and as-built drawings applicable to WORK completed for the billing period in question.

1.03 UNIT QUANTITIES SPECIFIED

A Quantities and measurements indicated in the Bid Form and shown on the Drawings are for bidding and CONTRACT purposes only.

1.04 MEASUREMENT OF QUANTITIES

A. The CONTRACTOR, upon mobilizing to the site, may perform an initial site survey for confirmation of the ENGINEER's survey. The ENGINEER's survey will be used to calculate the volumes of material excavated and filled for each of the bid items.

1.05 DEFECT ASSESSMENT

A. If the CONTRACTOR exceeds the tolerance for filling or excavation without written authority from the OWNER or ENGINEER, the surface must be regraded to be within the tolerance limits at no cost to the OWNER. CONTRACTOR may be responsible for the cost incurred by the OWNER in resurveying final surfaces.

B. The authority of the OWNER to assess the defect and identify payment adjustment is final.

1.06 PROJECT OPERATION AND IMPLEMENTATION

A. Bid Schedule A:

1.1 Mobilization (Bid Item 1.1) – LUMP SUM price for mobilizing equipment, people, and materials to the project site. Payments will be made once WORK is completed as determined by the OWNER and ENGINEER.

1.2 Project Support and Project Administration (Bid Item 1.2) – LUMP SUM price for CONTRACTOR's project management, coordination with OWNER and ENGINEER, meetings, CONTRACTOR's quality control testing and surveying, and general conditions including but not limited to: phone, fax, computer, utilities, water, toilets, and waste disposal. Payments will be made once WORK is completed as determined by the OWNER and ENGINEER.

1.3 Site Preparation, Clearing, and Demolition (Bid Item 1.3) – LUMP SUM price for tree clearing; fence removal; demolition and disposal of existing structures, topsoil stripping and stockpiling; supplying, installing, and maintaining erosion control measures until construction is completed; construction and maintenance of temporary access roads; dust control and dewatering of work areas until completion of construction; and protection of existing railroad tracks and site utilities. Payment will be made on a LUMP SUM basis once work is completed as determined by the OWNER and ENGINEER.

2.1 Bathymetric Surveys (Bid Item 2.1) – LUMP SUM price to complete pre-dredge, post-organic material dredging, and post-dredging surveys for grade documentation and quantity verification. Payment will be made on a LUMP SUM basis once the WORK is completed, surveyed, and approved by the OWNER and ENGINEER.

2.2 Install/Maintain Turbidity Controls (Bid Item 2.2) – LUMP SUM price to install turbidity controls around the dockwall and dredging work areas, and to maintain turbidity controls throughout the duration of work. Payment will be made on a LUMP SUM basis once work is completed as determined by the OWNER and ENGINEER.

2.3 Remove and Dispose of Turbidity Controls (Bid Item 2.3) - LUMP SUM price to remove and property dispose of turbidity controls upon the completion of work. Payment will be made on a LUMP SUM basis once work is completed as determined by the OWNER and ENGINEER.

3.1 Sheetpile Dockwall Installation (Bid Item 3.1) – LUMP SUM price to install sheetpile dockwall along the approved bulkhead line, including deadman support wall and tie rods. OWNER may directly purchase the steel sheet piling if a

financial benefit is determined. If OWNER does purchase sheet piling, Contractor shall be responsible for accuracy of order and the return of extra material for a credit to Brown County. Payment will be made on a LUMP SUM basis once the WORK is completed, surveyed, and approved by the OWNER and ENGINEER.

3.2 CB60 Sheetpile Support Wall (Bid Item 3.2) – LUMP SUM price to install sheetpile support wall across the CB60 sediment cap as toe support for the northern revetment berm as indicated on the Drawings. OWNER may directly purchase the steel sheet piling if a financial benefit is determined. If OWNER does purchase sheet piling, Contractor shall be responsible for accuracy of order and the return of extra material for a credit to Brown County. Payment will be made on a LUMP SUM basis once the WORK is completed, surveyed, and approved by the OWNER and ENGINEER.

3.3 Mooring Bollards (Bid Item 3.3) – UNIT PRICE to supply and install seventeen mooring bollards as indicated on the Drawings. Payment will be made on a per EACH basis once the WORK is completed and approved by OWNER and ENGINEER.

3.4 Timber Fenders (Bid Item 3.4) – UNIT PRICE to supply and install timber fender rails along the top and front side of the dockwall as indicated on the Drawings. Payment will be made on a per LINEAL FOOT basis once the WORK is completed, surveyed, approved by the OWNER and ENGINEER.

4.1 Dredging of Organic Sediments (Bid Item 4.1) – UNIT PRICE to dredge upper layer of soft, organic sediments from the Fox River and Bay of Green Bay. Includes dredging, loading, hauling, and placement of sediments within the Bay Port Dredged Material Re-Handling Facility as directed by OWNER. Payment will be made on a CUBIC YARD basis once the work is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

4.2 Dredging of Clay (Bid Item 4.2) – UNIT PRICE to dredge native clay material from within the Fox River and Bay of Green Bay. Includes dredging, loading, hauling, and placement of clay on the site for reuse as engineered fill material. Payment will be made on a CUBIC YARD basis once the work is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

5.1 Marine Stone Fill Behind Dockwall (Bid Item 5.1) – UNIT PRICE for supply and placement of 1 ¼-inch aggregate backfill material behind dockwall. Payment will be made on a per TON basis once the WORK is completed, surveyed, approved, and the volume of material determined by the ENGINEER.

5.2 Marine Stone Fill in Bay (Bid Item 5.2) – UNIT PRICE for supply and placement of aggregated fill material below the water line within the Bay north of the site. Payment will be made on a per TON basis once the WORK is completed, surveyed, approved, and the volume of material determined by the ENGINEER.

5.3 Marine Stone Fill in Discharge Channel (Bid Item 5.3) – UNIT PRICE for supply and placement of aggregated fill material below the water line within the former discharge channel. Payment will be made on a per TON basis once the WORK is completed, surveyed, approved, and the volume of material determined by the ENGINEER.

5.4 Marine Stone Fill in Boat Slip (Bid Item 5.4) – UNIT PRICE for supply and placement of aggregated fill material below the water line within the former boat slip. Placement of marine stone fill in the boat slip will need to be done in a controlled manner to prevent mudwaving of the existing soft sediments within the slip. Placement of marine stone fill is anticipated to be done by conveyor or equivalent means to achieve controlled lift thicknesses. Vibrating wire piezometers will be installed by OWNER and actively monitored by ENGINEER during filling. ENGINEER may require slowing or temporarily stopping placement of fill within the slip to allow pore pressures to dissipate and prevent mudwaving. Payment will be made on a per TON basis once the WORK is completed, surveyed, approved, and the volume of material determined by the ENGINEER.

5.5 Site Structural Fill (Bid Item 5.5) – UNIT PRICE for moisture conditioning, placement, grading, and compaction of clay from dredging operations for using in raising site grades and filling the boat slip, bay, and discharge channel above the water line. Payment will be made on a CUBIC YARD basis once the WORK is completed, surveyed, approved, and the volume of material determined by the ENGINEER.

5.6 3” Breaker Run (Bid Item 5.6) – UNIT PRICE for supply and installation of breaker run for support under the aggregate base course under the access roads, stockpile areas, and asphalt pad as indicated in the Contract Documents. Conversion rate of 1.75 tons per cubic yard assumed based on WisDOT Section 311.4. Payment will be made on a per TON basis once the WORK is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

5.7 1 ¼” Dense Graded Aggregate Base (Bid Item 5.7) – UNIT PRICE for supply and installation of 1 ¼” dense graded aggregate base for the asphalt pad subgrade and access roadways, and the upper surface of the nonpaved areas of the site as indicated in the Contract Documents. Conversion rate of 1.85 tons per cubic yard assumed based on WisDOT Section 305.4. Payment will be made on a per TON basis once the WORK is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

5.8 Revetment Berm Riprap (Bid Item 5.8) – UNIT PRICE for supply and installation of extra heavy riprap for the face of the northern revetment berm as indicated in the Contract Documents. Payment will be made on a CUBIC YARD basis once the WORK is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

5.9 Remove Existing Topsoil Stockpile from Site (Bid Item 5.9) – UNIT PRICE to find an appropriate end use and remove existing topsoil stockpile from the site. Payment will be made on a CUBIC YARD basis once the WORK is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

6.1 Excavation of Detention Ponds (Bid Item 6.1) – UNIT PRICE to excavate two detention ponds on site as outlined in the Drawings. The soil from the excavation shall be reused as compacted fill materials on site. Payment will be made on a CUBIC YARD basis once the WORK is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

6.2 Detention Ponds Clay Liner (Bid Item 6.2) – UNIT PRICE place, grade, and compact a 2-foot-thick clay liner in each of the two detention ponds as indicated on the Drawings. Payment will be made on CUBIC YARD basis once the work is

completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

6.3 Detention Pond Outlet Structures (Bid Item 6.3) – UNIT PRICE to install two concrete outlet structures in the detention ponds as indicated on the Drawings. Payment will be made on a per EACH basis once the work is completed as determined by the OWNER and ENGINEER.

6.4 West Side Concrete Lined Ditch (Bid Item 6.4) – UNIT PRICE to install approximately 575 feet of concrete lined ditch along the western perimeter of the site as indicated on the Drawings. Payment will be made on a LINEAL FOOT basis once the work is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

6.5 24” Diameter Concrete Stormwater Pipe (Bid Item 6.5) – UNIT PRICE to supply and install 24-inch diameter reinforced concrete pipe at the downstream end of the west side concrete lined ditch and from each of the two detention ponds as indicated on the Drawings. Price per foot of pipe includes excavation and backfill of pipe. Payment will be made on a LINEAL FOOT basis once the work is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

6.6 Artesian Well Drain Tile (Bid Item 6.6) – LUMP SUM price to supply and install approximately 500 feet of 6” diameter, perforated. HDPE SDR 17 pipe and discharge to western ditch as indicated on the Drawings. The drain tile pipe will be bedded and backfilled within a minimum 12” layer of clean stone. Payment will be made on a LUMP SUM basis once WORK is completed as determined by the OWNER and ENGINEER.

7.1 Electrical Distribution and Transformers (Bid Item 25) – LUMP SUM price to install electrical service from Bylsby Avenue to the disconnect locations on the northern and southern portions of the site as indicated on the Drawings. A metering station will be installed near Truck Scale A location. Payment will be made on a LUMP SUM basis once work is completed as determined by the OWNER and ENGINEER.

8.1 Asphalt Pad (Bid Item 8.1) – UNIT PRICE for supply and installation of a 38,720-square yard asphalt pad on the northern portion of the site as indicated on the Drawings. Payment will be made on a per ACRE basis once the WORK is completed, surveyed, approved, and the quantity of material determined by the ENGINEER.

8.2 Truck Scale A (Bid Item 8.2) – LUMP SUM price to supply and install a bi-directional truck scale as indicated on the Drawings. The scale shall be a Rice Lake Survivor OTR Steel Deck truck scale, or equivalent. WORK includes installation of concrete approach ramps, kiosks on each end of scale, and installation of AWS software system.

8.3 Flint Hills Resources Dockwall Repair (Bid Item 8.3) – LUMP SUM price to investigate section of dockwall experiencing loss of gravel between sheets and repair using grout bags or another method approved by OWNER and ENGINEER. Payment will be made on a LUMP SUM basis once work is completed as determined by the OWNER and ENGINEER.

9.1 Post-Construction Restoration (Bid Item 9.1) – LUMP SUM price for final site restoration, including trash removal, repair of access roadways, seeding of disturbed vegetated areas, and removal of temporary utilities and facilities. Payment will be made on a LUMP SUM basis once work is completed as determined by the OWNER and ENGINEER.

9.2 Equipment and Material Demobilization (Bid Item 9.2) – LUMP SUM price to demobilize construction equipment, excess materials, and personnel from the site. Payment will be made on a LUMP SUM basis once work is completed as determined by the OWNER and ENGINEER.

PART 2 - PRODUCTS

A. Not Used.

PART 3 - EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1. SECTION INCLUDES

A. This Section describes PROJECT administrative requirements; the minimum level of coordination and meetings required to execute the WORK and required pre-mobilization submittals.

1.2. ON-SITE CONSTRUCTION PERSONNEL

A. The CONTRACTOR is to maintain a full-time ON-SITE SUPERINTENDENT, who will be responsible for quality control and competent person(s) for the duration of the WORK. The SUPERINTENDENT will be responsible for the supervision and/or coordination of all CONTRACTOR employees, SUBCONTRACTORS, manufacturers, fabricators, suppliers, distributors, installers, and testing agencies whose services, materials or equipment are required to ensure the completion of the WORK. The SUPERINTENDENT will have sufficient qualifications, experience, and authority to act as a single point of contact for the on-site staff, and to adjust the means and methods as needed and as requested by the OWNER.

B. The CONTRACTOR is to maintain a full-time Health and Safety Officer (HSO), who will be responsible for implementing and documenting the CONTRACTOR's health and safety plan for the CONTRACTORS' personnel and subcontractors for the duration of the WORK. The HSO will be responsible for implementing the CONTRACTOR's health and safety plan for all CONTRACTOR employees, SUBCONTRACTORS, manufacturers, fabricators, suppliers, distributors, installers, and testing agencies whose services are required on-site. The HSO will have sufficient qualifications, experience, and authority to act as a single point of contact for compliance with the Health and Safety Plan.

C. The ENGINEER will provide on-site representatives to observe and document the WORK. At a minimum, this will include a CONSTRUCTION MANAGER and a CQA TECHNICIAN. The ENGINEER will not direct the CONTRACTOR with regard to their means and methods of construction but may identify areas of non-conformance with the SPECIFICATIONS that require redress by the CONTRACTOR.

1.3. MEETINGS

A. Attend all PROJECT meetings as deemed necessary by the OWNER during the term of the CONTRACT.

B. A pre-construction meeting will be held prior to the start of the WORK. At a minimum, the CONTRACTOR'S project manager and SUPERINTENDENT for the PROJECT will attend the meeting. It is recommended that the CONTRACTOR assemble input from primary SUBCONTRACTORS prior to this meeting.

1. This meeting is intended to make certain that the WORK is properly scheduled, responsibilities are coordinated among SUBCONTRACTOR and suppliers, and that

those responsibilities are reflected on the CONTRACTOR submittals. Questions concerning any other aspect of the PROJECT may also be addressed.

Beginning with the mobilization to the site, at a location designated by the OWNER, the CONTRACTOR will facilitate weekly construction meetings for the duration of the WORK. Present a progress update at weekly construction meetings that includes tasks completed from the prior week, currently active tasks, and tasks/activities planned for the next two weeks along with an updated PROJECT schedule. The format of the two-week look ahead must be approved by the OWNER.

C. The standard day and time for the weekly construction meeting will be established based on mutual agreement between all regular participants.

D. Individuals authorized to discuss and make decisions on behalf of the CONTRACTOR, relative to the meeting agenda, must participate in all weekly construction meetings.

E. All expenses associated with attending the meetings, except those that are incurred by the OWNER, their representatives, or consultants, are to be borne by the CONTRACTOR.

1.4. REQUESTS FOR INFORMATION, CLARIFICATIONS, AND CHANGES

A. All requests for PROJECT information, clarifications, or changes in the requirements of the CONTRACT DOCUMENTS must be made in writing to the ENGINEER.

B. Written requests must be provided regardless of any preceding conversations and preliminary decisions regarding the subject matter(s).

C. At the discretion of the ENGINEER, e-mail communications may qualify as “requests made in writing” for the purposes of this provision.

D. The ENGINEER will provide written responses to each request after soliciting feedback from others (OWNER, regulatory agencies, etc.) as warranted.

E. The ENGINEER may also issue clarifications and/or amendments based on their own assessment of PROJECT needs.

F. Any potential increases or decreases in CONTRACTOR compensation due to amendments will be in accordance with the provisions of the Supplemental Conditions.

G. If latent or unforeseen conditions require modifications to the CONTRACT, the CONTRACTOR must propose changes in the WORK by submitting a detailed request to include labor rates, equipment rates, material costs, etc. for a change to the ENGINEER.

1.5. RECORDS

A. Maintain copies on-site of all PROJECT correspondence and PROJECT documents generated during the WORK.

1.6. PRE-MOBILIZATION SUBMITTALS

All submittals are subject to review and approval by the OWNER and/or the ENGINEER. Provide all submittals to the ENGINEER who will then forward them onto the appropriate party for review. Submittals will not be approved until the reviewing party has determined

that they meet the minimum requirements of these specifications. Claims for lost time or requests for extensions based on rejected pre-mobilization submittals will be denied.

A. CONTRACTOR Health and Safety Plan:

1. Prepare and submit a site-specific CONTRACTOR Health and Safety Plan.

2. Refer to Specification 00 73 19 for details on what must be included in the CONTRACTOR Health and Safety Plan.

B. PROJECT Schedule:

1. Prepare a Critical Path Method (CPM) or bar chart PROJECT schedule and provide it to the OWNER at the first post-award meeting. Update and disseminate the schedule on a weekly basis.

C. Pre-Construction Condition Documentation:

1. Perform a pre-construction condition documentation of the site to 50 feet beyond the PROJECT limits under the supervision of the OWNER and/or ENGINEER.

a. Submit the findings of the pre-construction condition documentation to the ENGINEER prior to mobilization.

b. Include video/photographic documentation of the existing conditions of the SITE and surrounding structures, including dock walls, floating docks, piers, and building or other structures in-place at the harbor.

c. Claims determined to be resulting from pre-existing structural and/or cosmetic damage, not identified during the pre-construction survey, will be the sole responsibility of the CONTRACTOR to remedy to the satisfaction of the applicable owner(s).

D. Dredging Plan:

1. Refer to Specification Section 35 20 23 for details on the information required to be included in the CONTRACTOR supplied Dredging Plan.

E. Schedule of Permits:

1. Submit copies of all supplemental and/or recurring data required by the permits to the OWNER, as needed. Include documentation that the supplemental data was provided to the entity that issued the permit, according to the schedule required by the permit.

2. Submit copies of any CONTRACTOR obtained permits to the ENGINEER.

1.7. DAILY REPORT

A. Prepare a daily report summarizing the staff and equipment used and WORK performed. The CONTRACTOR'S internal documentation used for this purpose may fulfill this requirement, subject to approval by the OWNER. At a minimum, the daily report will include the following additional items:

1. Summary of any safety related issues including a summary of the daily safety meeting and running total of safe hours worked.

2. Total dredge volume, dredging rate, and approximate up-time for the reporting period and a brief description of where the WORK was being performed.

3. Approximate disposal rate for dredge sediments trucked to Bay Port or re-used as fill on site for the reported period and a brief description of where the WORK was being performed.

4. Total length of sheet pile installed during the reporting period and a brief description of where the WORK was being performed.

5. Total area of engineered fill placement and a brief description of where the WORK was being performed.

6. Status of the turbidity controls. Note any maintenance performed on the systems, unsatisfactory performance observed, and corrective actions taken.

B. Submit the daily report to the ENGINEER by 10 AM of the next calendar day.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. This section summarizes the protocol and procedures for the preparation and delivery of submittals to the OWNER.

1.02 GENERAL REQUIREMENTS

A. The CONTRACTOR shall review and approve all submittals prior to submittal to the OWNER.

B. Provide all submittals in electronic format directly to the ENGINEER. The OWNER may require review and recommendation by ENGINEER prior to approval. The OWNER reserves the right to request that any submittal be provided via paper copy.

C. Include calculations, drawings, plans, reports, records, photographs, diagrams, and details with submittals, as needed, to facilitate the review and/or approval process.

D. Provide all required submittals via e-mail unless otherwise directed.

E. CONTRACTOR shall submit all submittals to the OWNER and ENGINEER in sufficient time for checking and processing. Any submittals shall be of sufficient clarity so that copies thereof will be legible.

F. All submittals by SUBCONTRACTORS shall be sent directly to the CONTRACTOR for approval before being forwarded to the OWNER and ENGINEER. The CONTRACTOR shall be responsible for their submission to the ENGINEER at the proper time so as to prevent delays in delivery of materials.

G. All submittals shall be referenced properly to clearly indicate the location, service, and function of each particular item and the specification paragraph under which it is being furnished.

H. Submittals that are related to or affect each other shall be forwarded simultaneously as a package to facilitate coordinated review. Uncoordinated submittals will be rejected.

I. The ENGINEER reserves the right to require submittals in addition to those called for in individual sections.

J. The term “Shop Drawings” include drawings, diagrams, schematics, descriptive literature, illustrations, schedules, performance and testing data, and similar materials furnished by the CONTRACTOR to explain in detail specific portions of the WORK required by the contract.

K. When product sheets and Shop Drawings indicate more than one product, clearly indicate the specific products that are proposed to be used (e.g., specific pipe diameters or schedule ratings when multiple sizes/schedules are listed) and indicate their intended use.

L. Provide submittals electronically in the format requested (i.e., document file, drawing file, image file, etc.). For electronic drawings, submit AutoCAD 2016 (or later) file using the e-transmit feature (i.e., include external references, image files, color table file, font file, line file, etc.). Convert all AutoCAD add on data to AutoCAD format. Use descriptive layer titles (i.e., not numbers or internal use acronyms). Use extensive layer control and use line color by layer and line type by layer management. AutoCAD files of the DRAWINGS will be made available to the CONTRACTOR selected to perform the WORK, upon request.

M. Certifications must be signed by an officer or other individual authorized to sign on behalf of the entity. Submittals requiring preparation by an ENGINEER or surveyor must be signed and sealed by a Professional ENGINEER/Surveyor licensed to practice engineering in Wisconsin.

N. Schedule submittals to expedite WORK. Provide the OWNER a minimum of five (5) Business Days, excluding transmittal time, for review.

1.03 SUBMITTAL PROCEDURES

A. Each submittal shall be numbered with the PROJECT name (abbreviated), Specification section and submittal number in consecutive order (Ex NAME-01 33 00-#). Where resubmission is required, a letter shall be assigned to designate each resubmission (Ex. NAME- 01 33 00-#A, NAME-01 33 00-#B, etc.)

B. Use a cover form for each submittal. Include the PROJECT name, PROJECT number used by the OWNER, date, submittal number, submittal description/title, submittal exclusions, and deviations from the CONTRACT DOCUMENTS (if any) on each cover form. The submittal cover form must be signed by an individual authorized to sign documents on behalf of the CONTRACTOR.

C. Use the same units of weights and measures on submittals that are used in the CONTRACT DOCUMENTS.

D. Identify variations from the CONTRACT DOCUMENTS and product or system limitations that may be detrimental to successful performance of the completed WORK.

E. Resubmit submittals if requested by the OWNER. When performing a submittal revision, identify all changes made since previous submission. For each re-submittal allow the same number of WORKDAYS required for review as the original submittal.

F. Submittals not requested will not be recognized or processed.

G. The CONTRACTOR shall distribute approved submittals to job site and record documents files and to suppliers and SUBCONTRACTORS as required.

1.04 SUBMITTAL REGISTER

A. Maintain a technical submittal register at the SITE. Including the submittal number, description, date submitted, status, and date of approval/rejection.

1.05 SUBMITTAL REVIEW

A. Submittals will be reviewed solely for the purpose of determining whether the information contained in the submittal conforms to the design concept of the CONTRACT DOCUMENTS. Submittals will be returned with the following classifications:

1. No Exceptions Taken: WORK may proceed, no exceptions taken.

2. Furnish as Corrected: WORK may proceed subject to comments, resubmittal not required.

3. Revise and Resubmit: WORK may not proceed, resubmittal required for indicated items. Proceed with WORK on other items subject to comments.

4. Rejected: WORK may not proceed, resubmittal required, submittal unresponsive and/or not in conformance with CONTRACT DOCUMENTS.

B. Any review performed by the OWNER or ENGINEER is for the limited purpose of checking for conformance with the information given and the design concept expressed in the CONTRACT DOCUMENTS. Review is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions or quantities. Approval of a specific item does not constitute approval of an assembly of which the item is a component. The review and approval of the CONTRACTOR'S submittals does not relieve the CONTRACTOR from complying with the requirements of the CONTRACT DOCUMENTS. The CONTRACTOR is responsible for: dimensions to be confirmed and correlated at the jobsite; fabrication processes and construction means, methods, techniques, sequences, or procedures; coordination of the WORK of all trades; and performing all WORK in a safe and satisfactory manner.

1.06 CERTIFICATES OF COMPLIANCE

A. Certificates must be signed by an official authorized to sign on behalf of the manufacturing or testing company.

B. For each certification, include the name and address of the SUBCONTRACTOR, name of the requestor, the PROJECT name and location, relevant test data (if required), and the dates of shipment and delivery.

C. Certifications do not relieve the CONTRACTOR from the requirement for furnishing materials that comply with the requirements of the CONTRACT DOCUMENTS.

1.07 INVOICES

A. Submit monthly invoices in accordance with the provisions of the Supplemental Conditions.

1. Submit invoices on a form approved by the OWNER with an updated schedule showing contract values, approved Change Orders, WORK completed to date, current invoice and quantity amounts, and balance to complete for each bid item.

2. Quantities and estimates of percent complete shall be approved by the CONSTRUCTION MANAGER before invoice submittal to OWNER.

3. No payment will be made unless all the proper supporting documentation has been submitted and accepted by the CONSTRUCTION MANAGER and ENGINEER.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 57 00

PROTECTION OF ENVIRONMENT

PART 1 GENERAL

1.01 SUMMARY

A. CONTRACTOR, in executing WORK, shall maintain WORK areas on- and off-site free from environmental pollution that would be in violation of federal, state, or local regulations.

1.02 PROTECTION OF STORM SEWERS

A. Prevent construction material, pavement, concrete, earth, or other debris from entering existing storm sewer or sewer structures.

1.03 PROTECTION OF WATERWAYS

A. Observe rules and regulations of State of Wisconsin and agencies of US government prohibiting pollution of lakes, streams, rivers, or wetlands by dumping of refuse, rubbish, dredge material, or debris.

B. Disposal of materials into waters of state must conform to requirements of WDNR and US Army Corps of Engineers. Permits, if necessary, will be obtained by OWNER and provided to CONTRACTOR(S) for posting on job site.

C. Provide holding ponds or approved method which will divert flows, including storm flows and flows created by construction activity, to prevent excessive silting of waterways or flooding damage to property.

D. Comply with procedures outlined in US EPA manuals entitled, “Guidelines for Erosion and Sedimentation Control Planning and Implementation,” Manual EPA-72-015 and “Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity,” Manual EPA 43019-73-007.

E. CONTRACTOR runon and runoff controls and dewatering shall comply with site requirements and permit.

1.04 PROTECTION OF AIR QUALITY

A. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment and encourage shutdown of motorized equipment not in use.

B. Do not burn trash on construction site.

C. If temporary heating devices are necessary for protection of WORK, they shall not cause air pollution.

D. Dust control is the responsibility of the CONTRACTOR.

1.05 USE OF CHEMICALS

A. Submit MSDS for all chemicals prior to bringing it on site.

B. Submit a Spill Prevention Plan for all chemicals prior to bringing on site, outlining storage and handling requirements and response actions if a spill were to occur.

C. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, shall be approved by US EPA or US Department of Agriculture or any other applicable regulatory agency.

D. Use and disposal of chemicals and residues shall comply with manufacturer's instructions.

1.06 NOISE CONTROL

A. Conduct operations to cause least annoyance to residents in vicinity of WORK and comply with applicable local ordinances.

B. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.

C. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.

D. Conduct operations so as equipment causes a minimum of noise and dust.

1.07 DUST CONTROL

A. Due to the location of project, take special care in providing and maintaining temporary site roadways, OWNER'S existing roads, public roads, borrow area, and stockpiles used during construction operations in clean, dust-free condition.

B. Comply with local environmental regulations for dust control and directions of OWNER. If CONTRACTOR'S dust control measures are considered inadequate by OWNER, OWNER will require CONTRACTOR to take additional dust control measures.

1.08 FUELS AND LUBRICANTS

A. CONTRACTOR to comply with all local, state, and federal regulations concerning the transportation and storage of fuels and lubricants.

B. A fuel storage and equipment refueling area shall be designated by OWNER. The CONTRACTOR shall be and remain liable for compliance by its employees, agents, and subcontractors that all refueling take place in the designated area. Containment requirements shall be submitted by CONTRACTOR for approval in writing by OWNER.

C. Submit a Spill Prevention Plan for all fuels and lubricants prior to mobilizing to the site, outlining storage and handling requirements and response actions if a spill were to occur.

D. All spills or leakage shall be reported to OWNER and CONTRACTOR shall be responsible for cleanup and proper disposal, as required.

E. OWNER reserves the right to order damaged or leaking equipment off-site.

PART 2 PRODUCTS

A. Not used.

PART 3 EXECUTION

A. Not used.

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING AND SURVEYING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. CONTRACTOR Responsibilities and Submittals

B. Layout, Verification, and Submittal Requirements

C. As-built Construction Documentation DRAWINGS

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 35 20 23 – Dredging by Mechanical Methods

C. Section 31 41 16 – Steel Combination Dockwall

1.03 GENERAL CONTRACTOR RESPONSIBILITIES AND SUBMITTALS

A. CONTRACTOR is responsible for all survey work and layout required to perform the WORK, except for that surveying specified herein as being the responsibility of the OWNER.

B. The CONTRACTOR shall immediately, upon entering the site for purpose of beginning work, locate general reference points and take such action as is necessary to prevent their destruction. CONTRACTOR shall lay out the WORK and be responsible for all surveys, lines, elevations, and measurements of the Structures and other WORK executed by CONTRACTOR under the Contract. CONTRACTOR must exercise proper preparation to verify figures on the DRAWINGS before laying out WORK and will be held responsible for any error resulting from failure to exercise such precaution.

C. CONTRACTOR shall verify grades, lines, levels, locations, and dimensions as shown on DRAWINGS and report any errors or inconsistencies to the PROJECT MANAGER and ENGINEER before commencing WORK. Starting of WORK by CONTRACTOR shall constitute acceptance of all existing conditions.

D. Any work done without being properly located may be ordered removed and replaced at the CONTRACTOR's expense.

E. CONTRACTOR is responsible for collecting as-built data, preparing, and submitting as-built construction DRAWINGS as specified herein.

F. Survey work to be performed by CONTRACTOR shall be certified by a Registered Land Surveyor (RLS) or Professional Engineer (PE), or Certified Hydrographer experienced in hydrographic surveys, to perform its verification surveys. The surveyor or engineer shall be responsible for completing the documentation surveys, as-built drawings, and grade tables.

G. CONTRACTOR shall carefully preserve all monuments, benchmarks, groundwater monitoring wells, reference points and other facilities. CONTRACTOR will be charged with the expense of replacement of any such items destroyed and shall be responsible for any mistakes or loss of time that may be caused. Permanent monuments or benchmarks that must be removed or disturbed shall be protected until they can be properly referenced for relocation. CONTRACTOR shall furnish materials and assistance for the proper replacement of such monuments or benchmarks at no cost to the OWNER.

1.04 LAYOUT, VERIFICATION AND SUBMITTAL REQUIREMENTS

A. Provide field engineering services as required herein. Utilize recognized engineering survey practices.

B. Establish elevations, lines and levels as required. Periodically verify layouts.

C. For verification of grades, slopes and material thickness constructed by the CONTRACTOR, the CONTRACTOR's surveyor shall obtain and document a matrix of survey points.

D. CONTRACTOR shall submit survey data for each of the surfaces or layers as described above in an electronic copy of the grade table supplied by the ENGINEER. The tabulated data shall include the coordinate, elevation, difference from previous elevation (for material thickness checks) and the design elevations. CONTRACTOR shall obtain written approval from ENGINEER prior to the placement of any overlying materials.

1.05 AS-BUILT SURVEYS

A. Within 10 days or as specified below after ENGINEER's and PROJECT MANAGER's approval of a surface or layer, the CONTRACTOR's Hydrographic Surveyor shall prepare and submit as-built DRAWINGS for the particular surface or layer. The following DRAWINGS shall be submitted:

1. Pre-dredge Conditions.

2. Bottom of Organic Sediment.

3. Final post-dredging Conditions.

B. Each drawing shall contain as a minimum the following items:

1. 2-foot contour interval.

2. Title block with name of project.

3. Plan drawing at 1 inch=120 feet on 22-inch by 34-inch sheets.

4. Table of elevations on each drawing.

5. Identification of surface features such as roads, etc.

C. DRAWINGS are to be submitted in hard copy format and three-dimensional AutoCAD Version 2014 or newer contour file on CD-ROM, USB storage device, or other electronic format acceptable to the ENGINEER. In addition, the point data set for each survey

performed on which the DRAWINGS are based, shall be submitted in digital form (i.e., .DAT files.)

1.06 OWNER SURVEY RESPONSIBILITIES

A. If necessary, the OWNER may employ a surveyor for verification of CONTRACTOR SURVEYS.

B. All OWNER survey data and related calculations will be available for review by the CONTRACTOR.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 71 33

UTILITY COORDINATION

PART 1 GENERAL

1.01 UTILITY COORDINATION REQUIREMENTS

A. The Contractor shall call utility locating service a minimum of 3 working days, excluding Saturdays, Sundays, and holidays prior to beginning each excavation in areas where public utilities have not been previously located. Members will thus be routinely notified. This does not relieve the Contractor of the responsibility of notifying utility owners who may not be part of the location service alert system.

B. The Contractor shall coordinate with the City of Green Bay prior to excavating or making connections to existing water or sanitary utilities within the Bylsby Avenue right-of-way.

C. The Contractor shall coordinate with appropriate utility owners for connection and/or installation of gas and electrical lines.

1.02 PROTECTION OF UTILITIES

A. Where any utility, water, sewer, gas, telephone, or any other public or private utilities are encountered, the Contractor must provide adequate protection for them, and he will be held responsible for any damages to such utilities arising from his operations. Contractor shall be responsible for adjustment of all structures affected by construction. Structures and castings shall be set to within ¼” to 3/8” below and parallel to proposed roadway surface. Payment for this item shall be considered incidental to all other construction work.

B. When it is apparent that construction operations may endanger the foundation of any utility, conduit, or support of any structure, the Contractor shall notify the utility owner of this possibility, and he shall take such steps as may be required to provide temporary bracing or support of conduits or structures. Where existing utility lines are damaged during the performance of the work, the Contractor shall immediately notify the appropriate utility representative. The Contractor shall, when requested, make such repairs as may be necessary to restore and protect the damaged facility.

1.03 MEASUREMENT AND PAYMENT

A. No additional compensation will be paid to the Contractor for delays due to material shortages or other reasons beyond the control of the Owner, or for delays on construction due to the encountering of existing utilities that are, or are not, shown on the Drawings.

B. Work stoppages by employees of the utility companies which results in a delay of utility revisions on any portion of this project may be considered the basis for a claim for an extension of time for completion but will not be considered the basis for a claim for extra compensation or an adjustment in contract unit prices.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Adjusting.

D. Project record documents.

E. Operation and maintenance data.

F. Warranties.

G. Spare parts and maintenance materials.

1.02 RELATED SECTIONS

A. Section 01 50 00 – Temporary Facilities

1.03 CLOSEOUT PROCEDURES

A. Submit written certification that CONTRACT DOCUMENTS have been reviewed, WORK has been inspected, and that WORK is complete in accordance with CONTRACT DOCUMENTS and ready for OWNER'S review.

B. Provide submittals to OWNER that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.04 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:

1. CONSTRUCTION DRAWINGS.

2. TECHNICAL SPECIFICATIONS.

3. Addenda.

4. Change Orders and other modifications to the Contract.

5. Reviewed Shop Drawings, Product Data, and Samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by OWNER.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

2. Field changes of dimension and detail.

3. Details not on original Contract drawings.

G. Legibly stamp all documents "As Prepared by CONTRACTOR, Record Documents."

H. Submit documents to OWNER with claim for final Application for Payment.

1.06 WARRANTIES

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from SUBCONTRACTORS, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in binder with durable cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

A. Not Used.

END OF SECTION

SECTION 02 10 00

SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials, equipment, labor, testing, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:

1. Mobilization and demobilization of all equipment, labor, materials, supervision, survey, and any incidentals required to satisfactorily complete this project in accordance with these Specifications, the Contract Drawings and as directed by the Engineer.
2. Comply fully with all requirements and conditions of all Regulatory Approvals as attached to the Contract Documents including performance of any miscellaneous work required to ensure full compliance and not otherwise covered by individual items in the contract.
3. Provide and maintain all siltation controls for the duration of the project.
4. Site investigation including, but not limited to:
    a. Location of underground utilities within the project limits.
5. Coordinating removals by others, including, but not limited to, utility poles and wires and transformers.
6. Perform all other miscellaneous work required to complete the project, but not covered by individual items in the contract.
7. Temporary support or relocation and reestablishment of utilities to the extent required to complete the work.
8. Perform site work operations and the removal of debris and waste materials to ensure minimum interference with navigation, streets, walks, parking facilities, buildings, and all other adjacent facilities.
9. Obtain Owner’s written permission, when required, to close or obstruct street, walks, and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways, when required.
10. Obtain written permission from property owners to access and/or cross their properties where an easement has not been granted.
11. Control and monitor dust caused by the work and comply with pollution control regulations of governing authorities.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Demolition under DEMOLITION, SECTION 02 41 00
2. Earthwork under EARTHWORK, SECTION 31 20 00
3. Environmental Controls under PROTECTION OF ENVIRONMENT, SECTION 01 57 00

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.03 SUBMITTALS

A. Phasing plan & schedule.

B. Staging area plan(s) and security fencing.

C. Location and phasing work plan of staging and construction areas and the schedule for moving materials or equipment into those areas shall be submitted for ENGINEER's approval prior to mobilization and related site preparation operations.

D. Updated project schedule shall be submitted weekly for ENGINEER's approval.

E. Name and qualifications of firm performing the pre- and post-construction surveys. Submit pre- and post-construction surveys within 1 week of completing the surveys.

F. Details of work areas and temporary construction staging as required to prevent debris and dust and other construction materials from entering the water.

G. Details of work excavation and shoring.

H. Details of any crane lifting operations and layout including a work plan.

1.04 PROTECTION

A. Protect existing structures and facilities that are adjacent to the work area from damage caused by the project operations. Repair all damage caused to the satisfaction of the ENGINEER, at the sole expense of the CONTRACTOR.

B. Do not interfere with use of adjacent buildings or facilities. Maintain free and safe passage to and from adjacent buildings and facilities or both and between them and the public way.

C. Cease operations and notify ENGINEER immediately if safety of adjacent structures, workers, or the general public appears to be endangered. Take precautions to properly support structures and protect workers and general public. Do not resume operations until safety is restored.

D. The CONTRACTOR shall erect a safety barrier around his work areas as defined in the staging and phasing work plan.

1.05 MAINTAINING TRAFFIC

A. Do not close or obstruct roadways or other areas without prior authorization and/or permits.

B. Do not close or obstruct vehicle and equipment access at any time.

C. Conduct operations with minimum interference to public or private roadways. Coordinate with local and state officials, police, and emergency agencies regarding all operations on public roadways.

1.06 ENVIRONMENTAL PROTECTION

A. Comply with all requirements of environmental regulations and Regulatory Approvals.

B. Provide measures to prevent any construction debris, fuels, or lubricants from entering waterways. Any material discharge into the water shall be retrieved/cleaned up immediately.

C. The CONTRACTOR is hereby made aware that all work is subject to conditions set forth in the Regulatory Approvals which include, but are not limited to, permits, licenses, etc., issued by the DNR, USACE, and City of Green Bay.

D. Copies of the Regulatory Approvals and conditions for performing the work are included within the Contract Documents. The Contractor shall be responsible for understanding and implementation of the stipulated conditions as a condition of this Contract.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use materials required by the Specifications and/or shown on the Contract Drawings. Additional materials needed to complete the work may be selected by the CONTRACTOR and used with approval by the ENGINEER.

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. Notify "Diggers Hotline" and local utilities and services as applicable prior to conducting any work in order to have all known utilities and services marked out before work begins.

B. Existing structures and utilities shall be suitably protected from damage, including but not limited to existing buildings, wharfs and bulkheads, pavements and curbs, lighting, fencing, concrete vaults, manholes, hydrants and utility lines.

C. Complete pre- and post-construction surveys within 2 weeks of start and end of construction, respectively.

3.02 PROTECTION OF CONSTRUCTION SITE

A. It is the CONTRACTOR's responsibility to secure the construction site, both for the protection of the ongoing work and the protection of OWNER personnel and SUBCONTRACTORS. The site currently has perimeter fencing installed; however, the fencing adjacent to the water will be removed at some point during construction.

3.03 INSPECTION

A. The OWNER may assign inspectors and/or resident ENGINEERS to this project on a full time or part time basis, as required to cover the work under this Contract, as justified by the OWNER. The inspector or resident ENGINEER shall be the OWNER's representative for this project.

B. The ENGINEER must be notified at least 48 hours in advance of all material shipments so they can arrange for inspections as the shipments arrive on site.

C. All materials that are not suitable for placement on this project and/or have been rejected by the ENGINEER shall be removed from the site immediately. The cost of the removal of these materials shall be the responsibility of the CONTRACTOR.

D. Unless otherwise agreed upon with the ENGINEER, no work shall be done with materials that will be partially or completely buried or hidden from view without the presence of the ENGINEER. The ENGINEER reserves the right to have all materials uncovered for inspection if placed without direct supervision, at the sole expense of the CONTRACTOR. No materials shall be paid for under this Contract that have not been examined and passed by the ENGINEER, or for any reason are placed outside the prescribed limits of the work.

E. The ENGINEER shall be permitted at all times to check the lines, grades, elevations, reference marks, batter boards, etc. set by the CONTRACTOR. Errors or discrepancies identified by checks shall be corrected by at the CONTRACTOR at the CONTRACTOR's expense. Additionally, these checks shall not be construed to be an approval of the CONTRACTOR's work and shall not relieve or diminish the CONTRACTOR's responsibilities for the accurate and satisfactory completion of the entire work. The CONTRACTOR shall be available to assist the ENGINEER with these checks as needed.

3.04 PHASING OF CONSTRUCTION

A. Except as may be restricted elsewhere within the Contract Documents, the CONTRACTOR will be allowed to perform work 24 hours per day, seven days per week, excluding holidays, for the entire performance period. The CONTRACTOR shall note the terms of the applicable environmental permits if conducting work outside of normal working hours (7AM to 5PM).

B. No work shall commence without prior approval of the ENGINEER and approved phasing work plan in place.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Examination of Existing Conditions: The CONTRACTOR shall examine the Contract Documents and bid attachments for demolition and removal requirements and provisions for new work. Verify all existing conditions and dimensions before commencing work. If there is a conflict between the Contract Documents and Bid attachments, CONTRACTOR shall notify the OWNER and ENGINEER and shall comply with the OWNER's resolution of the conflict. To discover and resolve either conflicts or lack of definition that might create demolition problems, the CONTRACTOR shall submit any questions regarding the extent and character of the demolition and removal work in the manner and within the time period established for receipt of such questions during the bidding period.

B. Should Drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

C. Work under this Section, without limiting the generality thereof, consists of providing all materials, equipment, labor, storage, transportation facilities, and all other incidentals as indicated on the Contract Drawings, stipulated in the Specifications and as reasonably implied by either or both for the complete removal and disposal of the following:

1. Disconnect all utilities; remove existing utilities from within 10 feet of existing structures, unless otherwise noted on the plans; and remove electrical power cables from existing conduit.

2. Sequence work and maintain stability of all existing structures and slopes during demolition.

3. All demolition work required or specifically called for on the Contract Drawings and additionally as required to accommodate the proposed work including, but not limited to:

a. Selective demolition of existing dockwall/ sheet pile wale structures

b. Selective demolition of discharge slip weir structure

c. Marine timber dolphins

d. Fencing

e. Jersey Barriers

f. Utility and drainage structures, pipe and conduits.

g. Overhead electrical/ light fixtures

h. Unless noted otherwise, demolish and dispose of any structures, fences, concrete pads or bituminous pavement encountered within the limits of demolition shown on the Contract Drawings.

i. All demolition work required or specifically called for on the Contract Drawings and additionally as required to accommodate the proposed work including, but not limited to demolition and disposal of the following:

1) Cutting, removal, and disposal of asphalt pavement

2) Cutting, removal, and disposal of reinforced and unreinforced concrete slabs or foundations interfering with the proposed work

3) Cutting, removal and disposal of timber interfering with the proposed work

4) Shoring of excavation

D. Removal from site and legal disposal of all materials, trash, debris, etc., dismantled and/or removed by demolition operations, except any items specifically to remain the property of the OWNER.

1. All solid waste and debris generated at the site shall be hauled for disposal at the Brown County South Landfill in Greenleaf, Wisconsin.

E. Incidental materials necessary for the completion of the work in this section and usually furnished in connection therewith, shall be furnished and installed whether or not specifically mentioned.

F. All existing removed materials, items, trash, and debris under this item shall become property of the CONTRACTOR and shall be completely removed from the Site and legally disposed of at the CONTRACTOR's expense. Salvage value belongs to the CONTRACTOR. On-site sale of materials is not permitted.

G. Recycling of all materials to the extent practical.

H. Scheduling and sequencing of operations without interrupting utilities serving abutters and other areas. If interruption is required, obtain written permission from the utility company and the OWNER. Provide temporary services as necessary to serve occupied and usable facilities when permanent utilities must be interrupted, or schedule interruption when the least amount of inconvenience will result.

I. Obtaining all necessary permits, providing necessary notifications, and complying with all local, state, and federal laws regarding safety and demolition.

J. The control of noise and dust.

K. The protection of adjacent structures, sidewalks, and other features outside the limits of the work of this specification.

L. Prevention of pollution to waterways.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Site Preparation under SITE PREPARATION, SECTION 02 10 00.

2. Earthwork under EARTHWORK, SECTION 31 20 00.

3. Environmental Controls under PROTECTION OF ENVIRONMENT, SECTION 01 57 00.

1.03 CODES, STANDARDS, ORDINANCES AND PERMITS

A. Perform all work in strict accordance with all rules, regulations, standards, codes, ordinances, or laws of local, state, and Federal authorities having lawful jurisdiction, and be responsible for compliance therewith. Such authorities include but are not limited to the following:

1. The Wisconsin Commercial Building Code (WCBC).

2. The Brown County Port & Resource Recovery Department.

3. The Wisconsin Department of Safety and Professional Services (DSPS).
4. “Ambient Air Quality,” Wisconsin Admin. Code ch. NR 404.
5. “Resource Conservation and Recovery Act,” 40 CFR 261-262.
6. “Hazardous Waste Operations and Emergency Response,” Federal Occupational Safety and Health Act (OSHA), 29 CFR 1910.120.
7. ANSI/ASSE A10.6 “Safety Requirements for Demolition Operations”
8. NFPA 241 “Standard for Safeguarding Construction, Alteration, and Demolition Operations”.
9. Other federal, state, and local statutes, ordinances, regulations, or rules pertaining to this Section and the work described herein, including the storage, transportation and disposal of asbestos.
10. All regulations by the above and other governing agencies in their most current version are applicable throughout this project. It is the CONTRACTOR’s responsibility to know, understand, and abide by all such regulations and practices. Where there is a conflict between this Specification and the cited state, federal, or local regulations, the more restrictive or stringent requirements shall prevail.

B. The CONTRACTOR shall give the proper authority all requisite notices and secure and pay all permits, licenses, inspections, and certificates relating to his work.

C. All work performed and all equipment and materials furnished and/or installed shall be in accordance with all standards as hereinafter specified. All standards shall be of the latest edition.

1.04 QUALIFICATIONS

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

1.05 SUBMITTALS

A. Before beginning work, submit a Demolition Plan containing the following:

1. Introduction describing work to be done.
2. Detailed sequence of demolition to ensure stability of all existing structures and the existing shoreline. All requirements for temporary support shall be the responsibility of the CONTRACTOR at no additional cost to the OWNER.
3. Detailed schedule of demolition and removal work, with early and late starting and finishing dates for each activity.
4. Details of falsework, staging, or other containment as required to catch and remove demolition debris such as concrete and rebar in accordance with the environmental permits
5. Description of proposed demolition methods and protection for adjacent areas not being demolished
6. Description of equipment (including cut sheets).
7. Interruption of utility services: indicate how long utility services will be interrupted.
8. Coordination for shutoff, capping, and continuation of utility services.

9. Locations of proposed dust- and noise-control temporary partitions and means of egress.
10. Proposed disposal facility for each category of demolition materials
11. Methods for maintaining dust control.
12. Methods for monitoring and controlling noise.
13. Safety precautions to be undertaken during operations.
14. Evaluation of existing structures by an ENGINEER to confirm that loads to be encountered during demolition activities can be adequately supported by the structures.
15. Site Security Plan
16. Dust Control Plan
17. Health and Safety Plan

B. Landfill Records: Provide a Waste Management Report that includes the location and quantity of material disposed of, and the quantity diverted from disposal for recycling, salvage, or reuse. Include trip tickets (receipts) indicating receipt and acceptance of wastes by each disposal facility or recycling, salvage, or reuse facility licensed to accept said wastes.

1. All solid waste generated at the site shall be disposed of at the Brown County South Landfill.

C. Provide a copy of all permits, completed shipping manifests, and destruction certificates to the OWNER.

D. Submit a copy of all sampling analyses to the OWNER within 2 days of receipt of the laboratory reports for the sampling required in this Section. Analytical data shall be kept confidential, distributed only to the OWNER.

E. CONTRACTOR shall provide to the OWNER copies of all weight slips, both tare and gross, for every load weighed and disposed of at the disposal or recycling facilities. The OWNER shall only allow progress payments after receipt of these weight slips.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services. Coordinate with utility providers and the OWNER and terminate utilities according to the providers' requirements.

1. Prior to commencing cutting work in existing surfaces, take all precautionary measures to assure that utility services to the area have been made inactive. Only licensed tradesmen of that trade shall disconnect and cap existing mechanical and electrical items that are to be removed, abandoned and/or relocated.
2. If, during the process of cutting work, existing utility lines are encountered which are not indicated on the Drawings, regardless of their condition, immediately

report such items to the ENGINEER. Do not proceed with work in such areas until instructions are issued by the ENGINEER. Continue work in other areas

3.02 PREPARATION

A. Bidders shall examine the site and make their own estimates of the types and quantities of demolition, which will be required to fulfill the contract requirements.

B. Provide proper notification of demolition, removal, and disposal, of hazardous building materials identified during work as required by local, state, and federal regulations. The OWNER and ENGINEER are not responsible for work by the CONTRACTOR that is performed with improper notice.

C. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 02 10 00, SITE PREPARATION.

D. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

2. Remove temporary shoring, bracing and structural supports when no longer required.

3. Post warning signs and place barricades as applicable during placement and removal of temporary shoring.

E. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area(s).

1. Erect temporary protection, such as walks, and fences, where required by authorities having jurisdiction or as shown on the plans. Provide temporary barricades as required to limit access to demolition areas.

2. Install temporary environmental protection measures as specified in Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, to prevent the discharge of construction debris and other pollutants from entering open bodies of water.

F. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

G. All painted surfaces shall be assumed to contain LBP.

H. Notify the OWNER and the ENGINEER immediately if ACM, LBP, PCBs, CFCs, and mercury are encountered. If encountered:

1. Prepare and manage materials containing ACM, LBP, PCBs, CFCs, and mercury in accordance with applicable local, state, and federal regulations.

I. Manage and dispose of materials in accordance with applicable local, state, and federal regulations.

J. Remove, stockpile, and dispose of all treated timber.

1. Perform all sampling and laboratory testing necessary to characterize the treated timber components for disposal.

2. Load, transport, and dispose of the treated timber components at an appropriate disposal facility licensed to accept treated wood products. Submit disposal manifests to the ENGINEER prior to the completion of the project.

K. Any additional applicable pre-disposal testing requirements of the receiving facility of the demolition debris, or as required by any applicable codes or regulations, shall be identified and performed by the CONTRACTOR. The CONTRACTOR is responsible for determining the demolition procedures and the resulting required testing and disposal required to comply with all applicable codes and regulations.

3.03 APPLICATION

A. The work shall be conducted with prime consideration given to the following:

1. Compliance with applicable laws and building codes.

2. Safety, protection, and convenience of the public and workmen.

3. Minimization of dirt and dust proliferation.

4. Protection of the existing building structure, materials, and finishes from damage.

5. Neat and accurate cutting and trimming of elements to be partially removed, subject to ENGINEER's approval.

6. Minimum interruption to the continuous operation of the Facility.

B. All work shall be done in accordance with applicable Federal, State and local laws, rules, regulations, codes and ordinances and all necessary permits required for the demolition work shall be procured by the General CONTRACTOR, including DPS Demolition Permit, and State Plumbing Permit (as required). Provide unobstructed exits approved by the OWNER at all times.

C. All materials removed during demolition designated for disposal shall become the property of the CONTRACTOR unless otherwise noted.

D. All materials removed during demolition, except those which are to be reused, shall be disposed of off the site in conformance with all municipal, state and federal regulations.

E. Do not work in affected areas until the various dust and protective barriers have been installed.

F. CONTRACTOR shall be responsible for all concrete saw cutting and removal and disposal of material.

G. Debris shall not be allowed to accumulate and shall be sprinkled during handling and loading to reduce dust. All debris shall be either stored temporarily in CONTRACTOR furnished dumpster type container(s) provided by the CONTRACTOR at his expense, or shall be removed from the site daily, to ensure absolute minimization of dusting and other pollution. Segregate debris as required for disposal.

3.04 DEMOLITION

A. General: Completely demolish and remove existing construction, including below grade features such as, but not limited to, footings, foundations, slabs, piping, conduit, and wiring structures as shown on the plans. Use methods required to complete the work within limitations of governing regulations and as follows:

1. Proceed with demolition systematically, from higher to lower level. Complete demolition operations above each floor or tier before disturbing supporting members on the next lower level.

2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

4. Maintain adequate ventilation when using cutting torches.

5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

7. Locate demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

8. Dispose of demolished items and materials promptly in accordance with the requirements of this specification and all applicable local, state, and federal regulations.

B. Material Segregation

1. Separate Asphalt, Brick and Concrete (ABC) rubble from wood, mechanical equipment, and steel. Any coated ABC shall be separated and properly disposed. The remaining ABC rubble may be crushed onsite for onsite reuse or transported off-site for recycling or disposal. If the CONTRACTOR elects to reuse materials onsite, the material shall be crushed to pieces less than 4-inches in any dimension. Reuse, salvage, and recycle materials from the demolition to the greatest extent possible.

3.05 PROTECTION OF PUBLIC AND PROPERTY

A. Provide all measures required by federal, state, and municipal laws, regulations, and ordinances for the protection of surrounding property, the public and workmen during all demolition and removal operations. Measures are to be taken, but not limited to installation of sidewalks, sheds, barricades, fences, warning lights and signs, trash chutes, and temporary lighting.

B. Protect all buildings, fences, walks, roads, streets, curbs, pavements, trees, plantings, utilities, and other features on and off premises. Should any such items be damaged by the CONTRACTOR during the execution of the work, the CONTRACTOR shall bear all costs for correcting such damage as directed by the ENGINEER, and to the satisfaction of the OWNER.

C. Perform demolition in a manner that will ensure the safety of adjacent property. Protect adjacent property from damage and protect persons occupying adjacent property from injuries which might occur from falling debris or other causes. Do not interfere with the use of adjacent buildings or the free access and safe passage to and from the same.

D. Prevent movement or settlement of sidewalks, roads, streets, curbs, and pavements. Install all necessary bracing and shoring in connection with demolition and removal work.

E. Remove portions of structures with care by using tools and methods that will not transfer heavy shocks to existing building structures both internal and external of the particular work area.

F. Provide and maintain in proper condition, suitable fire resistive dust barriers around areas where interior demolition and removal work is in progress, to prevent dust migration to adjacent areas. Remove dust barriers upon completion of major demolition and removal in the particular work area.

3.06 DISCOVERY OF HAZARDOUS MATERIALS

A. If previously unknown hazardous materials or unmarked containers are discovered, cease work in the affected area and immediately notify the ENGINEER and the OWNER. Do not proceed with work in such areas until approved by the OWNER. Continue work in other areas.

B. If Asbestos Containing Materials are identified allow for 10-day asbestos notification prior to start of asbestos abatement.

1. Handle, manage, and dispose of Asbestos Containing Materials in accordance with the requirements of this specification and applicable local, state, and federal regulations.

3.07 CUTTING

A. CONTRACTOR shall be responsible for all concrete saw cutting and removal and disposal of material

B. Provide a flush, full depth saw cut edge where pavement, curb, and concrete removals abut existing surfaces to remain undisturbed

C. Take care to avoid damage to existing structures or part structures to remain as noted within the Contract Documents.

3.08 DISPOSAL OF DEMOLISHED MATERIALS

A. General:

1. Do not burn demolished materials.

2. Do not allow demolished materials to accumulate on-site.

3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Manage and dispose of materials in accordance with applicable local, state, and federal regulations.

3.09 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Leave premises in a clean condition.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDES

A. Furnishing, placing and finishing cast-in-place conventional concrete required for construction of the Work.

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures.

B. Section 03 31 30 – Reinforced Concrete.

1.03 SUBMITTALS

A. Concrete placement drawings for all concrete; identify locations of joints; coordinate with required submittals.

B. Plan for cold weather concrete procedures, including procedures for transporting, placing, protecting, curing, and monitoring temperature of concrete during cold weather. Include procedures to be implemented upon abrupt changes in weather conditions or equipment failures. Include procedures for protecting the subgrade from frost, and for preventing the accumulation of ice or snow on reinforcement or forms prior to placement.

C. Plan for hot weather concreting procedures, including procedures for transporting, placing, protecting, curing, and monitoring temperature of concrete during hot weather.

D. Concrete curing methods, including manufacturer's data for curing compound.

E. Statement of Qualifications for CONTRACTOR's resident superintendent for concrete placement.

F. Pre-installation Conference minutes.

G. Quality Control:

1. Concrete batch ticket for each load of concrete delivered to the site.

2. Results of quality control tests.

1.04 REFERENCES

A. The following is a list of standards that may be referenced in this Section:

1. American Concrete Institute (ACI):

a. ACI 301 - Specifications for Structural Concrete.

b. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.

c. ACI 302.1R - Guide for Concrete Floor and Slab Construction.

d. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

e. ACI 304.2R - Placing Concrete by Pumping Methods.

f. ACI 305R - Hot Weather Concreting.

g. ACI 306.1 - Standard Specification for Cold Weather Concreting.

h. ACI 309R - Guide for Consolidating Concrete.

i. ACI 308.1 - Standard Specification for Curing Concrete.

j. ACI 318/318R - Building Code Requirements for Structural Concrete and Commentary.

2. ASTM International (ASTM):

a. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

b. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

c. ASTM C138 – Standard Test Method for Density, Yield, and Air Content of Concrete.

d. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

e. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.

f. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

g. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

h. ASTM C617 – Standard Practice for Capping Cylindrical Concrete Specimens.

i. ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

j. ASTM 1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.

k. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds having Special Properties for Curing and Sealing Concrete.

l. ASTM E329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

3. Where these Specifications differ from the requirements of ACI or ASTM, the more stringent requirements shall apply.

1.05 DEFINITIONS

A. Exposed Concrete – Concrete surfaces that can be inside or outside of structures, regardless of whether concrete is above or below water, dry at all times, or can be seen when structure is drained.

B. Hydraulic Structures – Water retention or containment structures.

C. Defective Areas – Surface defects that include honeycomb, rock pockets, indentations greater than 3/16 inch, cracks 0.005-inch wide and larger as well as any crack that leaks for liquid containment basins and below grade habitable spaces; cracks 0.010-inch wide and larger in non-fluid holding structures spalls, chips, air bubbles greater than 3/4 inch in diameter, pinholes, bug holes, embedded debris, lift lines, sand lines, bleed lines, leakage from form joints, fins and other projections, form popouts, texture irregularities, and stains and other color variations that cannot be removed by cleaning.

D. New Concrete – Concrete less than 60 -days old.

E. Design Strength – As defined in Section 03 31 30 – REINFORCED CONCRETE.

1.06 QUALITY ASSURANCE

A. Pre-installation Conference:

1. Meeting attendees:

a. CONTRACTOR, including pumping, placing, finishing, and curing subcontractors. (Attendance mandatory.)

b. ENGINEER, including field inspection personnel. (Attendance mandatory.)

c. Concrete supplier representative. (Attendance mandatory.)

d. Quality control testing and sampling personnel. (Attendance mandatory.)

e. OWNER's representative. (Attendance optional.)

2. Agenda will include, as a minimum, the following topics:

a. Status of submittals.

b. Mix designs; required slump and air content requirements; admixture types, dosage, performance, and re-dosing at site; concrete placement temperature requirements.

c. Placement methods and equipment, consolidation, finishing, curing, and protection of concrete.

d. Quality control requirements and procedures.

e. Hot and cold weather procedures.

f. Other specified items requiring coordination.

PART 2 PRODUCTS

2.01 CONCRETE

A. Conform to the requirements of Section 03 31 30 – Reinforced Concrete.

2.02 CURING COMPOUND

A. Conform to the requirements of Section 03 31 30 – Reinforced Concrete.

PART 3 EXECUTION

3.01 GENERAL

A. Conform to ACI 301 and ACI 304R, except as modified by these Specifications.

B. Notify ENGINEER a minimum of 24 hours prior to commencement of concrete operations.

3.02 PREPARATION

A. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not cause hardship in placing concrete.

B. Remove debris and standing water from placement area. Dampen all earth and wood surfaces against which concrete will be placed. Keep surfaces moist until concrete is placed.

C. Do not place concrete until all formwork, reinforcement, and embedded items are properly placed and secured.

D. Have all necessary placing equipment on site prior to ordering concrete.

3.03 PLACING CONCRETE

A. Place class of concrete indicated on the Drawings. If a concrete class is not indicated, place Class A concrete.

B. Place concrete in as nearly a continuous operation as practical.

C. Place concrete in near horizontal layers. Use spreading equipment that prevents segregation and that produces layers of widths and thickness appropriate for proper consolidation. Place each successive layer as soon as practicable after the preceding layer is completed.

D. Use delivery and placement methods that do not cause segregation. The maximum free-fall drop height allowed for concrete placement shall be 4 feet.

E. Do not disturb reinforcement, inserts, embedded items, or formed joints.

F. Do not break or interrupt successive placements such that cold joints occur.

G. Prevent debris or other objectionable material from becoming embedded in the concrete.

H. Pumping Concrete:

1. Conform to ACI 304.2R.

I. Maintain standby pumping equipment on site, such that any interruption in placement operations due to equipment failure will not result in the formation of a cold joint.

J. Placement Time: Place concrete within 90 minutes after water is added to cement, unless appropriate set delay admixtures are used. Use of set delay admixtures must be approved by ENGINEER.

K. Allow a minimum of 7 days between adjacent placements at construction joints and contraction joints, unless otherwise indicated on the Drawings.

L. Inclement Weather:

1. Do not place concrete during heavy rain; defined as more than 0.3 inch per hour or 0.03 inch in 6 minutes (as defined by the Weather Bureau Glossary of Meteorology).

2. If unusual adverse weather, such as heavy rain, severe cold or heavy snow, occurs or is forecast to occur during placement, an interruption in placing operations may be approved or required by ENGINEER.

3. Fully consolidate all placed concrete materials prior to stopping work.

M. Cold Joints – Cold joints created by interruption of placement operations for any reason shall be treated as a construction joint.

3.04 CONSOLIDATING CONCRETE

A. Conform to ACI 309R.

B. Use immersion-type power vibrators, suitable for the concrete mix proportions and placement conditions of the respective placement.

C. Provide at least one standby vibrator prior to concrete placement.

3.05 COLD WEATHER PLACEMENT

A. Follow approved cold weather placement plan when the ambient air temperature is less than 40oF, or if the ambient air temperature is approaching 40oF and falling.

B. Develop cold weather placement plan in general conformance to ACI 306.1.

C. Do not place concrete against frozen earth or ice, or against forms or reinforcement with frost or ice present.

D. Maintain surface temperature of concrete above 40oF for a minimum of 7 days after placement is completed.

E. Do not locally heat or dry concrete when using heating units to meet Specification requirements.

3.06 HOT WEATHER PLACEMENT

A. Follow approved hot weather placement plan. Include in the plan ambient weather conditions, considering combined effects of air temperature, humidity, wind speed and solar radiation, under which hot weather placement procedures will be implemented.

B. Develop hot weather placement plan in general conformance to ACI 305R.

C. Maintain temperature of concrete at or below temperature requirements in Section 03 31 30 – Reinforced Concrete, until concrete is placed.

D. Provide shading, fog spraying, sprinkling, wet cover, or other means of maintaining concrete below the maximum specified temperatures.

3.07 CURING CONCRETE

A. Follow approved curing procedures in accordance with Section 03 31 30 – Reinforced Concrete.

3.08 PROTECTING CONCRETE

A. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical damage.

B. Do not allow construction vehicles or equipment on concrete until it has attained its specified design strength.

3.09 TOLERANCES

A. Tolerances are defined as allowable variation from specified lines, grades, and dimensions, and as allowable magnitude of surface irregularities.

B. Allowable Variation from Specified Lines, Grades, and Dimensions:

1. Conform to ACI 117.

2. Variation is defined as the distance between the actual position of the structure or any element of the structure and the specified position of the respective structure or element.

C. Allowable Magnitude of Surface Irregularities:

1. As specified in Table 1.

2. Concrete surface irregularities are defined as bulges, depressions, and offsets in hardened concrete surfaces.

3. Concrete surface irregularities are classified as "abrupt" or "gradual" and are measured relative to the actual concrete surface.

4. Abrupt Surface Irregularities:

   a. Defined as: offsets of the finished surface of formed surfaces, such as those caused by mis-aligned or loose forms, loose knots in form lumber, or other similar forming faults; and offsets of the finished surface of unformed surfaces, such as those caused by differential movement at joints.

   b. Measured using a 6-inch-long straight edge, held firmly against the concrete surface at the offset.

   c. The magnitude is the greatest distance from the concrete surface to the edge of the straight edge nearest the concrete.

5. Gradual Surface Irregularities:

   a. Defined as bulges and depressions resulting in gradual changes on the concrete surface.

   b. Measured using a template conforming to the design profile of the concrete surface being examined, held firmly against the concrete surface. Provide necessary templates, with a minimum length of 10 feet.

   c. The magnitude is the greatest distance from the concrete surface to the nearest edge of the template.

TABLE 1
TOLERANCES FOR CONCRETE SURFACE IRREGULARITIES

A.	Offsets (abrupt irregularities) on surfaces subject to high velocity hydraulic flow:	
	1. F4 Surfaces	
	Parallel to the flow:	0.25 in
	Other Orientations:	0.125 in
	2. U3 Surfaces	
	Parallel to the flow:	0.25 in
	Other Orientations:	0.125 in
B.	Offsets (abrupt irregularities) on surfaces not subject to high velocity hydraulic flow:	
	1. F1 Surfaces:	1 in (depressions only)
	2. F2 Surfaces:	0.25 in
	3. U1 Surfaces:	0.375 in
	4. U2 Surfaces:	0.25 in
C.	Gradual Changes (gradual irregularities) on surfaces subject to high velocity hydraulic flow:	
	1. F4 Surfaces	
	Parallel to the flow:	0.25 in per 10 ft, 0.75 in max deviation
	Other Orientations:	0.125 in per 10 ft, 0.5 in max deviation
	2. U3 Surfaces	
	Parallel to the flow:	0.25 in per 10 ft, 0.75 in max deviation
	Other Orientations:	0.125 in per 10 ft, 0.5 in max deviation
D.	Gradual Changes (gradual irregularities) on surfaces not subject to high velocity hydraulic flow:	
	1. F2 Surfaces:	0.25 in per 10 ft, 0.75 in max deviation
	2. U2 Surfaces:	0.25 in per 10 ft, 0.75 in max deviation

3.10 QUALITY CONTROL

A. Responsibility:

1. CONTRACTOR will perform all field quality control testing, obtain all field quality control samples, and perform all laboratory testing of field quality control samples for all cast-in-place concrete used in the Work.
2. CONTRACTOR will obtain additional samples and perform laboratory testing to verify concrete has met strength requirements for early form removal.
3. CONTRACTOR shall provide necessary materials and adequate access to OWNER's personnel for quality assurance testing.
4. CONTRACTOR will verbally advise ENGINEER of results of field quality control test results upon completion of respective tests. Copies of CONTRACTOR's field quality control test results will be provided to ENGINEER within 24 hours after testing.

B. General:

1. Quality control test results will be evaluated in accordance with ACI 301 and these Specifications.
2. Sampling and preparation of freshly mixed concrete shall be in accordance with ASTM C172 and ASTM C617.
3. Quality control laboratory shall meet the requirements of ASTM C1077.
4. Frequency of quality control testing may be increased at ENGINEER's discretion.
5. Concrete samples for pumped concrete will be taken from the placement (discharge) end of the pumping line. Where sampling at the pump discharge is impractical, samples will be taken at the pump supply hopper.

C. Compressive Strength:

1. Cylinder Preparation: ASTM C31.
2. Each set shall consist of five cylinders.
3. Three extra cylinders will be cast for each set cast during cold weather concreting operations. The extra cylinders will be field cured. Protect field curing cylinders; place and maintain cylinders in the curing environment of the representative concrete.
4. Frequency: Class A1 concrete (6,000 psi) - 1 set for each 50 cubic yards of concrete placed, or at least 1 set for each placement, whichever is greater. All other concrete – 1 set for each 100 cubic yards of concrete placed, or at least 1 set for each placement, whichever is greater.
5. Laboratory Test Procedure: ASTM C39.
6. For each set:
    a. 2 cylinders will be tested at 7 days.
    b. 2 cylinders will be tested at 28 days.
    c. 1 cylinder will be reserved and tested at 56 days if 28 day strength is not met.

D. Unit Weight:

1. Test Procedure: ASTM C138.
2. Frequency: 1 test for each batch of concrete from which concrete compression test cylinders are made.

E. Slump:

1. Test Procedure: ASTM C143.
2. Frequency: 1 test for each truckload or batch.

F. Air Content:

1. Test Procedure: ASTM C231.
2. Frequency: 1 test for each truckload or batch.

G. Temperature:

1. Test Procedure: ASTM C172.
2. Frequency: 1 test for each truckload or batch.
3. Measure temperature immediately prior to placement.

H. Tolerances:

1. Variation of all hardened concrete structures or elements of structures will be measured as necessary to verify compliance with Specification requirements.

END OF SECTION

SECTION 03 31 30

REINFORCED CONCRETE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials, equipment, labor, testing, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:

1. Dockwall
    a. King Pile Fill
2. Marine Bollards
    a. Concrete Foundations
    b. Concrete Deadman
    c. Bollard Grout Fill
3. Miscellaneous reinforced concrete items including, but not limited to:
    a. Utility protection
    b. Drainage structures
    c. Gate equipment foundations
    d. Metal building foundations
    e. Electrical raised structures
    f. Reinforced concrete pavement
    g. As otherwise shown on contract documents or needed to complete the work

B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Demolition under DEMOLITION, SECTION 02 41 00
2. Metal fabrications under MISCELLANEOUS METALS, SECTION 05 50 13
3. Earthwork under EARTHWORK, SECTION 31 00 00

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.03 QUALITY ASSURANCE

A. Except as noted, work shall conform to the latest edition of the following code specifications and standards:

1. American Society for Testing and Materials (ASTM)
2. American Concrete Institute (ACI):
    a. "Building Code Requirements for Reinforced Concrete", ACI 318.
    b. "Specifications for Structural Concrete for Buildings", ACI 301.
    c. "Recommended Practice for Measuring, Mixing, and Placing Concrete", ACI 304.
    d. "Recommended Practice for Cold (Hot) Weather Concreting", ACI 305 and ACI 306.
    e. "Guide to Formwork for Concrete", ACI 347.
3. Concrete Reinforcing Steel Institute (CRSI):
    a. Design of Reinforced Concrete Structures - "A Manual of Standard Practice".
    b. "Placing Reinforcing Bars".
    c. "Field Handling Techniques for Galvanized Reinforcing Bar"

1.04 SUBMITTALS

A. Shop Drawings:
    1. Reinforcing steel shop drawings:
        a. Shall be of such detail and completeness that all fabrication and placement at the site can be accomplished without the use of Contract Drawings for reference.
        b. Shall include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
        c. Shall show joint layout and design
    2. Contractor shall check structural and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete and shall make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.

B. Concrete mix designs for each type of work, each supplier and as specified in this Section

C. Concrete break history on the mix design for no less than 2 years of history

D. Concrete repair mortar/manufacturer/design mix

E. Name and address of Independent Testing Laboratory in conformance with ASTM E329 for approval by Engineer

F. Cold weather concrete protection and curing details in conformance with ACI 305R

G. Hot weather concrete protection and curing details in conformance with ACR 306R

H. Concrete wind protection and curing details

1.05 TESTING OF CONCRETE

A. Quality Control:

1. Test Specimens: The Contractor will be required to make, cure, and have tested a minimum of one set of five test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM Designations C172, C31, and C39. Two cylinders shall be broken after seven days and two cylinders after twenty-eight days. The fifth cylinder shall be stored on the site to the same conditions of the ongoing work as reserve to break if and when the placed concrete does not achieve the required strength at 28 days.
2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM Designation C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.
3. Air Content: The Contractor shall make an air content test from each day's pour of concrete by the pressure method in accordance with ASTM Designation C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. Testing: All personnel and laboratories testing concrete shall be licensed by the State of Wisconsin.
5. Test Failures: In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Engineer may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C-42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to the Owner. Any other work damaged because of this concrete removal shall be replaced with new materials to the satisfaction of the Engineer at no additional cost to The Owner. The cost of coring will be deducted from the Contract amount. Where core cylinders have been taken by the Testing Laboratory and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Engineer at no additional cost to the Owner.

B. The Contractor shall coordinate the date and location of tests with the Engineer before any concrete work is started.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Reinforcing steel shall be transported to the site, stored, and covered in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete or chip coating. A sufficient supply of approved reinforcing steel shall be stored on site at all times to ensure that there will be no delay of work. Identification of steel shall be maintained after bundles are broken.

PART 2 PRODUCTS

2.01 MATERIALS

A. The following materials shall be used unless specifications define elsewhere with a specific construction element.

B. Portland Cement: ASTM C 150, Type II or V of U.S. manufacture. Only one brand of cement shall be used on the project.

C. Aggregates:

1. Fine aggregate. ASTM C 33, clean and graded from 1/4 inch to fines.
2. Coarse aggregate. ASTM C 33, clean and graded from 1/4 inch to maximum sizes hereinafter specified.

D. All admixtures shall all be from the same manufacturer.

E. Air Entraining Agent: Conforming to ASTM C 260 for Air-Entraining Admixtures for Concrete.

F. Water Reducing Agent: Conforming to ASTM C 494 Type A for Chemical Admixtures for Concrete.

G. Shrinkage-Reducing Agent: Conforming to ASTM C 494 Type S. Admixture shall be non-expansive and able to reduce shrinking by a minimum of 40%. Shrinkage reducing agent shall be used in all concrete used.

H. Microsilica Admixture (if required): Packaged in easily dispersing form.

I. Water: Clean and potable, free of impurities detrimental to concrete.

J. Reinforcing Bars: New, deformed billet steel bars conforming to ASTM A 615, Grade 60.

K. Accessories: Reinforcement accessories, consisting of spacers, chairs, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement in place. All accessories shall be dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of the CRSI Standards herein before specified.

L. Mechanical splices shall meet or exceed ASTM A615.

M. Tie wire for reinforcement shall be 16 gauge or heavier dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of ASTM A-82.

N. Form Ties and Spreaders: Standard metal form clamp assemble and plastic cone, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Inner tie rod shall be left in concrete when forms are removed. No wire ties or wood spreaders will be permitted. Use 1/2" x 1" C.T. plastic cones for sinkages.

O. Form Coatings: Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface. Coating containing mineral oils or the nondrying ingredients will not be permitted.

P. Concrete Repair Mortar: A fast setting, high-strength, non-shrink repair suitable for overhead and vertical repairs, such as SikaRepair SHA with Sika Latex R, Five Star EZ-Cure Repair Mortar, Prospec Vertical Leveling Mortar, or approved equal. Surfaces shall be prepared and Concrete Repair Mortar shall be mixed and applied in accordance with the manufacturer’s recommendations.

Q. Bonding agents suitable for concrete and grout such as SIKA Armatec 110, EUCO #452 epoxy system or approved equal.

R. Bond Breaker:

1. Tape for Joints: Adhesive-backed glazed butyl or polyethylene tape. Same width as joint that will adhere to premolded joint material or concrete surface.

2. Nonstaining type, providing positive bond prevention

2.02 CONCRETE STRENGTHS AND PROPORTIONS

A. Cast-in-place concrete shall have the following minimum compressive strength at 28 days and shall be proportioned within the following limits:

Class	Minimum Strength at 28 days	Maximum Size of Aggregate	Water Cement Ratio	Minimum Cementitious Material Content	Maximum Cement Replacement	Air Entrainment (air content)

A	5000 psi	¾”	0.40	660 lbs./CY	Per ACI 318 Except Max slag 25%	5 to 7%

B. Air-Entrainment: The air content in all concrete shall be maintained as defined above.

C. Slump: The slump in 5000psi concrete shall be between 3 inches to 5 inches and in accordance with ASTM C 143.

D. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface.

E. Concrete mix design by supplier shall have been in satisfactory use for a minimum of 2 years.

PART 3 EXECUTION

3.01 CAST-IN-PLACE CONCRETE GENERAL

A. Falsework for Forms:

1. The Contractor shall build and maintain necessary falsework for the forms.

B. Construction of Forms:

1. Forms shall be constructed of sound material, of the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position. Cold joint forms shall have a roughened profile for adjacent pours.

2. During pumping, forms shall be inspected to guarantee that no leaks are present, and Contractor shall ensure that concrete, when cured, will result in a composition as specified herein.

3. Embedded Items:

a. Provisions shall be made for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features. No wood other than necessary nailing blocks shall be embedded in concrete. Complete cooperation shall be extended to suppliers of embedded items in their installation. Secure information for embedded items from other trades as required. All embedded items shall be securely anchored in correct location and alignment prior to placing concrete.

4. Openings for Items Passing Through Concrete:

a. Contractor shall establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections. Contractor shall be held responsible for proper coordination of all work of this nature in order that there will be no unnecessary cutting and patching of concrete. Any cutting and repairing to concrete, required because of failure to provide for such openings, shall be paid for by the Contractor at no additional expense to The Owner.

C. Removing Forms and Falsework:

1. Wood forms shall not be removed for at least 48 hours after concrete has been placed.
2. Forms shall not be removed until the concrete has attained sufficient strength to ensure stability.

D. Reinforcing Steel:

1. Reinforcing Steel: Shall be placed in accordance with the drawings and approved shop drawings and the applicable requirements of the "Codes and Standards" herein before specified. Install reinforcement accurately and secured against movement, particularly under the weight of workmen and the placement of concrete.
2. Reinforcing Steel Supports: Bars shall be supported on approved plastic or dielectric-coated metal chairs or spacers, accurately placed, and securely fastened to forms or steel reinforcement in place. Additional bars shall be supplied, whether specifically shown on the drawings or not, where necessary to securely fasten reinforcement in place. Support legs of accessories in forms without embedding in form surface. Spacing of chairs and accessories shall conform with CRSI's "Recommended Practice for Placing Bar Support". Hooping and stirrups shall be accurately spaced and wired to the reinforcement. No wood will be permitted inside forms. Lifting of welded wire fabric into proper position while concrete is being poured, rather than supporting fabric on chairs, will not be permitted.
3. Placing and Tying: All reinforcement shall be set in place, spaced, and rigidly and securely tied or wired with tie wire at all splices and at all crossing points and intersections in the positions shown, or as directed. Bending of bars on the job to accommodate existing conditions will not be permitted without the written approval of the Engineer. Point ends of wire ties away from forms.
4. Spacing: Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings, or, where not shown, the clear spacing shall be 2 times the bar diameter, but in no case less than 1-1/2 inches or 1-1/2 times the maximum sized aggregate.
5. Minimum edge distance of 3” unless otherwise noted on the Contract Drawings.
6. Splices shall be in accordance with the following:
    a. Lap Splicing:
        1) Maximum 50% of steel spliced occurring within lap length.
        2) Top bars shall be 1.4 times values given below.
        3) Splice lengths - #6 bars and smaller 40 bar diameters
        4) Splice lengths - #7 bars and greater 47 bar diameters
    b. Mechanical Splicing:
        1) Mechanical butt splices shall be the tension-compression shear screw and wedge coupling sleeve type, with smooth converging sides and cone-pointed hex-head screws, to develop a strength in the bar equal to $1.25F_y$
        2) Mechanical lap splices shall be the shear screw and double wedge coupling sleeve type, with converging sides and cone-pointed hex-head screws opposite the wedges.

7. Protective Concrete Covering: Except where shown otherwise on drawings, the minimum concrete coverage for steel reinforcement shall conform with the applicable revisions of the "Codes and Standards" herein before specified.

8. Reinforcement Around Openings: On each side and above and below pipe or opening, place an equivalent area of steel bars to replace steel bars cut for opening. Extend steel reinforcing a standard lap length beyond opening at each end.

9. Bar Cutting: Reinforcement bars shall not be cut in the field, unless permitted by Engineer.

10. Welding: Welding of reinforcement is not permitted.

E. Mixing of Concrete:

1. All concrete shall be ready-mixed concrete and shall be mixed and delivered in accordance with the "Specification for Ready-Mixed Concrete", ASTM C-94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.

2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event, not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.

3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.

4. No admixtures, except those mentioned in Paragraph 2.1 shall be used. Calcium chloride will not be permitted.

5. Truck delivery slips of all concrete delivered to the job shall be presented to the Engineer and shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. No concrete shall be placed until the Engineer has reviewed and approved the delivery slip for that placement.

F. Cold Weather Requirements:

1. Concrete shall not be mixed or placed when the temperature is below 40 degrees F., or when conditions indicate that the temperature will fall below 40 degrees F. within 72 hours unless precautions are taken to protect the concrete.

2. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.

3. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.

4. Calcium chloride shall not be used.

5. Contractor shall provide heating and/or insulation to formwork as required to comply with these minimum temperature requirements.

G. Hot Weather Requirements:

1. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by appropriate methods, if approved by the Engineer.

2. No concrete shall be deposited when the air temperature is greater than 90 degrees F.

H. Conveying and Placing Concrete:

1. Notification: Contractor shall notify Owner's Representative at least 48 hours in advance of any placement of concrete.

2. Form Preparation: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.

3. Excess Water: Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains into a sump or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.

4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).

5. Existing Concrete Preparation: All existing concrete that is to have fresh concrete placed against shall be surfaced roughened to a minimum of ¼" amplitude within 2 inches of the edges and shall be coated with approved bonding agent.

6. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.

7. Handling and Depositing of Concrete:

   a. Before any concrete is placed, the Contractor shall notify all whose work is in any way connected with or influenced by the concrete work and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.

   b. Immediately before concrete is placed, the Contractor shall inspect all forms to be sure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials and that all reinforcement is in proper position.

   c. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed. Cold joints will not be accepted.

   d. Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods, which prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid rehandling or flowing.

   e. Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.

   f. Concrete that has partially hardened shall not be deposited in the work.

8. Pumping:

a. Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed.

b. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.

c. The concrete mix shall be designed to the same requirements as herein before specified and may be richer in lubricating components to allow proper pumping.

d. Concrete shall not be pumped through aluminum pipes.

e. All pumping operations must have full-time inspection by a recognized testing laboratory approved by the Engineer and paid for by the Contractor. The cost of this fill-time inspection shall be included in the Contractor's bid proposal if the option of pumping is elected.

9. Vibrating and Compacting:

a. All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under experienced supervision and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.

b. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than seven thousand (7,000) impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.

c. Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Care shall be taken not disturb concrete which has its initial set. Vibrations shall not be used to walk concrete from one side to another within given form. Walking concrete will cause separation of the mix.

d. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least on inch.

e. The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.

I. Construction Joints:

1. Construction joints shall be located as shown on the Contract Drawings or where approved in joint location submittal. Horizontal construction and contraction joints shall be spaced at a maximum of 30 feet apart, unless shown or approved otherwise. If, for any reason, the Contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Engineer for approval. Where a

joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a thin coat of grout immediately before the placing of new concrete. Approved keys shall be used at all joints, unless detailed otherwise. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.

J. Expansion Joints:

1. Expansion joints shall be located as shown on Contract Drawings. Unless otherwise designed the joint shall include a joint filler, a bond breaker, and joint sealant, and be installed as indicated on Contract Drawings.

2. Surface Preparation:

a. Use wire brush or motorized device to mechanically roughen and thoroughly clean concrete surfaces on each side of joint from plastic waterstop to top of joint.

b. Use dry, high-pressure air to remove dust and foreign material, and dry joint.

c. Prime surfaces as required before placing joint filler.

d. Avoid damage to waterstop.

3. Installation:

a. Premolded Joint Filler:

1) Sufficient in width to completely fill joint space where shown.

2) Install per manufacturer’s written instructions.

3) If waterstop is in joint, cut premolded joint filler to butt tightly against waterstop and concrete face.

4) Precut premolded joint filler to required depth at locations where joint filler or sealant is to be applied.

5) Form cavities for joint filler with either precut, premolded joint filler, or smooth removable accurately shaped material. Entire joint above waterstop, in slabs, shall be formed and removed so that entire space down to waterstop can be filled with the pourable joint filler.

6) Vibrate concrete thoroughly along joint form to produce dense, smooth surface.

b. Bituminous Type Premolded Joint Filler:

1) Drive nails approximately 1 foot 6 inches on center through filler, prior to installing, to provide anchorage embedment into concrete during concrete placement.

2) Secure premolded joint filler in forms before concrete is placed.

3) Sponge Rubber Joint Filler: Install per manufacturer’s written instructions.

c. Pourable Joint Filler:

1) Install in accordance with the manufacturer’s written instructions, except as specified below:

2) Apply primer prior to pouring joint filler.

3) Fill entire joint above the waterstop with joint filler as shown.

4) Use masking tape on top of slabs at sides of joints; clean spillage. Remove masking tape afterwards.

5) Sealant products used as fillers need not meet sealant geometry parameters. Do not use backing rods.

d. Steel Expansion Joint Dowels:

1) Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to joint in both plan and section view, so as to permit joint to expand or contract without bending dowels.

2) Secure dowels tightly in forms with rigid ties.

K. Patching:

1. Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Engineer's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solid with matching concrete to produce firm bond and surface.

2. The Contractor shall do the entire cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted; nor shall any structural members or reinforcement be cut.

3. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 sand mix.

L. Protection and Curing:

1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.

2. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.

3. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least seven (7) days.

4. Carefully protect exposed concrete corners from damage.

5. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be cured with wetted Burlene or fog spray unless otherwise approved.

M. Concrete Finishes:

1. Unexposed Surfaces: All unexposed surfaces shall have form finish at the Contractor's option.

2. Wearing Surface Finish

a. The wear surface shall receive a monolithic steel trowel finish. Surfaces shall be finished with a screed, float, or steel trowel. Trowel shall be vigorously used at an angle under pressure by the finisher until troweling

gives evidence of shine or gloss as required to make a smooth, hard, dense, impervious surface, free of defects. Finishers shall work from kneeboards laid flat upon the surface. Mechanical troweling machines may be used if the desired finish and level tolerances can be obtained by their use, but finishing shall be by hand troweling.

b. Where directed, finish surfaces by scoring in parallel lines with a fine hair stable broom, perpendicular to the direction of traffic or as indicated on the drawings.

3. Exposed Surfaces:

a. Surfaces exposed to view shall be finished. Within 48 hours after the forms have been removed and form ties cut back from the face of the concrete, all voids and cavities shall be filled with a stiff mortar of the same composition and air-entrainment as the mortar in the original concrete mix. The same brand and color of cement, and the same kind and color of aggregate as was used in the original concrete mix shall be used in this mortar. The mortar for filling shall have been mixed and let set for 30 minutes and then remixed before placing in the work. The surface film of all such pointed surfaces shall be carefully removed before setting of the mortar occurs.

b. If the Engineer determines these surfaces as prepared do not present a uniformly smooth, clean surface of even texture and appearance, the surface shall be treated and rubbed to obtain a satisfactory finish. The Engineer shall be the sole judge of the amount of rubbing which will be required.

c. If rubbing is required, the rubbing will start within 48 hours of notification that the rubbing is required; the surface should be wetted with clean water and rubbed with a No. 16 carborundum brick or other abrasive of equal quality until even and smooth and of uniform appearance, without applying any cement or other coating. If additional finishing is necessary, it shall be obtained by a thorough rubbing with a No. 10 carborundum brick or other abrasive of equal quality. Subject to approval by the Engineer, rubbing may be performed by use of satisfactory power equipment and tools, providing the operational procedures shall be the same as those outlined above for hand rubbing.

d. Rubbing will be kept to the minimum found necessary to produce smooth, even surfaces of uniform appearance. Rubbing will not be required to fill very small surface air bubble holes.

e. Patches required for form ties, if carefully and properly done, may not necessitate rubbing. However, if the work is done in such a way that the patches are conspicuous; the entire exposed face on which they occur shall be rubbed.

f. After the final rubbing is completed, and the mortar has set up, the surface shall be thoroughly drenched and kept wet with clean water for a period of five days, unless otherwise directed.

g. No rubbing will be permitted when the air temperature is below 40 ^{o}F.

h. Any formed surfaces not exposed to view, including the underside of concrete decking, shall be finished. Immediately after forms have been removed and form ties cut back from the face of the concrete, all voids and cavities shall be fixed with a stiff mortar of the same composition and air-entrainment as the mortar in the original concrete mix. The mortar for filling shall have been mixed and let set for 30 minutes and then remixed

before placing in the work. In case the operation of filling is delayed, the surface of the concrete shall be thoroughly cleaned and washed with water, if necessary, before the mortar is applied.

4. Addition of Material:

a. The addition of cement, sand, water, or mortar to any surface while finishing concrete is strictly prohibited.

N. Backfill Against Structures:

1. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.

2. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

O. Defective Work:

1. The following concrete work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense:

a. Incorrectly formed.

b. Not plumb or level.

c. Not specified strength.

d. Containing rock pockets, voids, honeycomb, or cold joints.

e. Containing wood or foreign matter.

f. Otherwise not in accordance with the intent of the Drawings and Specifications.

P. Concrete Repair:

1. Inject cracks that leak with crack repair epoxy.

2. Repair defective areas of concrete.

3. Repair concrete surfaces using specified materials. Select system, submit for review, and obtain approval from Engineer prior to use.

4. Develop repair techniques with material manufacturer on surface that will not be visible in final construction prior to starting actual repair work. Obtain approval from Engineer.

5. Obtain quantities of repair material and manufacturer’s detailed instructions for use to provide repair with finish to match adjacent surface or apply sufficient repair material adjacent to repair to blend finish appearance.

6. Repair of concrete shall provide structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.

Q. Remove metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, by chipping back concrete to depth of 1 inch and then cutting or removing metal object.

R. Stationary Side Form Construction:

1. Where width of pavement is narrow, tapering, or of irregular pattern not lending itself to being constructed by prescribed machine methods, Contractor shall be permitted to place concrete as specified in Section 03 30 00, Cast-in-Place Concrete. Perform strike off, consolidation, final floating, and surface finishing with equipment, tools, means, labor, and methods other than those specified, provided the Work meets approval of Engineer and the following requirements:

a. As concrete is being placed, striking off and consolidating portland cement concrete shall be done without causing segregation of material and shall include thorough uniform vibration throughout the mass until it is uniformly compacted.

b. Portland cement concrete shall be struck off by means of templates or screeds designed and manipulated to shape portland cement concrete to specified cross section between forms, carrying a slight excess of Portland cement concrete in front of leading edge of templates or screeds at all times. Tamp Portland cement concrete to reduce voids to a minimum.

c. Floating shall follow vibrating, striking off, and tamping operations and shall include transverse floating or other smoothing and finishing action. This shall provide a surface and evenness within a 12 foot straightedge tolerance of 0.01 foot. Test hardened surface in presence of Engineer. Surface shall be free from laitance, soupy mortar, marks, or irregularities.

2. Defects:

a. Fill areas of minor honeycomb or other minor defect in composition of Portland cement concrete along exposed edges of portland cement concrete with a stiff mortar of cement and fine aggregate. Apply to moistened Portland cement concrete to satisfaction of Engineer.

b. Area showing serious defects in composition of concrete shall be removed and replaced with pavement of specified quality for full width of strip between longitudinal joints or edges and for a length not less than between the nearest transverse joints.

S. Pavement Joints:

a. General:

1) Referred to as contraction or construction, either of which may be transverse or longitudinal, as called for by Drawings or as approved by Engineer.

2) Joints, backer material, joint filler, and joint sealants shall extend to pavement edges or to each other, as the case may be, and shall be constructed perpendicular to surface of pavement.

3) Joints shall not vary from specified or indicated line by more than 1/4 inch.

4) Place manhole or similar large structure in line of joint, or if impractical, isolate structure from pavement with premolded joint filler, 1/2 inch wide, conforming to AASHTO M213 and ASTM D1751.

b. Joints:

1) Sawed Type with Poured Filler:

a) Joints shall be constructed as indicated on the drawings.

b) Perform saw cuts as soon as Portland cement concrete has set enough to permit sawing without tearing or raveling, before uncontrolled cracking results, and within 24 hours of placing portland cement concrete.

c) Saws may be single or tandem, as Contractor may elect, and shall be controlled by guides to true line.

d) Clean joints thoroughly of foreign matter before pouring approved rubber asphalt filler.

e) Tops of joint filler shall be true to pavement cross section within 1/8 inch and shall be protected from damage by Portland cement concrete operations.

f) Areas containing uncontrolled cracks shall be removed and replaced.

g) Restore curing agents broken or damaged by sawing operations.

2) Construction Joints:

a) Construct when there is an interruption of longer 45 minutes in Portland cement concrete placing operations or where specified.

b) Place parallel with intended contraction joint.

c) Tool both free edges of joints with 1/8 inch radius rounder to remove laitance and mortar resulting from finishing operations and to provide clean rounded edge. Tooling shall not form ridges on surface of concrete.

d) New Portland cement concrete placed contiguous to joint shall conform to proportions and consistency of previously placed concrete.

e) If sufficient Portland cement concrete has not been mixed at the time of interruption to place a construction joint at least 3 feet from a planned contraction joint, remove excess Portland cement concrete back to a position to satisfactorily meet these criteria and to satisfaction of Engineer.

f) Fill joint which has opened to a width of 1/8 inch or greater during construction or maintenance periods with poured filler.

g) Do not construct within 3 feet of a transverse contraction joint.

c. Surface Finishing:

1) Use temporary screeds. Wet screeding and jitterbugging shall not be permitted.

2) Pavement shall have surface tolerance of 1/4 inch in 10 feet in accordance with ACI 325.9R.

3) Salting, spreading of cement or cement and sand mixture to speed up hardening shall not be permitted.

4) Exposed pavement edges shall be edged to a 1/2-inch radius and construction joints shall be edged to 1/8-inch radius after finishing. Edging shall not form ridges on pavement surface.

5) Pavement shall be treated and protected by use of evaporation retardant applied in accordance with manufacturer’s written instructions. Flat surfaces shall be treated immediately after screeding and floating or if time period greater than 15 minutes occurs between finishing operations.

6) Pavement shall be screeded, floated, and given heavy nylon bristle-broomed skid-resistant surface.

a) Broomed surface with hand broom or mechanical broom device to produce 1/16 inch to 1/8-inch-deep striations oriented perpendicular to the direction of travel.

d. Curing of Portland Cement Concrete:

1) Immediately after the final floating, surface finishing, and edging has been completed, and while portland cement concrete surface is still moist, cover and cure entire exposed surface for at least 72 hours in accordance with one of the following provisions:

2) Ensure that concrete is not exposed for more than 30 minutes after finishing.

3) Liquid Membrane-Forming Compounds: Apply compound uniformly to Portland cement concrete by pressure spray methods at a rate which will form an impervious membrane, but at least at a rate of 1 gallon per 150 square feet.

4) Other Membranes:

a) Apply to damp Portland cement concrete as soon as it can be placed without marring surface.

b) Place in contact with surface, extend beyond sides or edges of slabs or forms, and fasten down to hold it in position as a waterproof and moisture proof covering.

c) Laps shall be sufficient to maintain tightness equivalent to sheeting.

d) Transverse laps for waterproof paper shall be at least 18 inches, and longitudinal seams shall be cemented.

e) Cotton or jute mats shall be saturated with water prior to placing and kept fully wetted during curing period.

5) Concrete shall be cured by use of curing compound, for minimum of 7 days after concrete placement, in accordance with ACI 308. Curing compounds shall be applied in accordance with manufacturer’s written instructions.

6) Exposed surfaces shall be sprayed with curing compound immediately after free surface water has disappeared from finished surface.

7) Concrete temperature shall be maintained in accordance with ACI 306R.

8) Curing compounds shall not come in contact with hardened concrete that is to be concreted against.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this Section, without limiting the generality thereof, consists of manufacturing or shop-fabricating metal elements itemized below and installation of all materials, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:

1. Dockwall
    a. Wale assemblies
    b. Bearing Plates
    c. Splice Plates
    d. Timber Rub Rail Connection Brackets
    e. Mooring Bollards
    f. Miscellaneous fabricated elements not otherwise identified

B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications.

1. Concrete under REINFORCED CONCRETE, SECTION 03 31 30
2. Hardware under MISCELLANEOUS METALS, SECTION 05 50 13
3. Marine Hardware under MARINE BOLLARDS AND CLEATS, SECTION 35 59 33

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.03 QUALITY ASSURANCE

A. Except as noted, work shall conform to the following codes and standards:

1. American Society for Testing and Materials (ASTM), latest edition.
2. American Institute of Steel Construction (AISC) Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings, latest editions.
3. American Welding Society (AWS).

1.04 SUBMITTALS

A. Submit for approval prior to fabrication all information necessary for the fabrication of the component parts. Indicate size and weight of members, type and location of shop and field connections, and the type, size, and extent of all welds and welding sequences. Use American Welding Society welding symbols. Approval of shop drawings will be for size and arrangement of principal and auxiliary members and strength of connections. Any errors in dimensions shown on shop drawing shall be the responsibility of the CONTRACTOR.

B. The CONTRACTOR shall use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Each welder shall be certified for the particular work, prior to commencing the work which must be accomplished.

C. Upon completion of this portion of the work, and as a condition of its acceptance, the CONTRACTOR shall deliver to the ENGINEER a letter signed by an official of the metal fabricating firm or firms certifying that all fabricated metal has been fabricated in complete accordance with this Section of these specifications.

D. Name and address of Independent Testing Laboratory for approval by ENGINEER.

1.05 PRODUCT HANDLING

A. All materials shall be delivered, stored, and handled with care to prevent damage to any material or material coating. Material damaged or with damaged coating will be rejected and replaced at no additional cost to the OWNER.

PART 2 PRODUCTS

2.01 MATERIALS

A. All structural steel, including rolled shapes, angles and plates shall conform to ASTM A572 Gr. 50 unless otherwise noted.

B. All structural steel piping shall conform to ASTM A252, Grade 3 unless otherwise noted.

C. All hollow structural tube sections shall conform to ASTM A-500 Grade B, unless otherwise noted.

D. All steel items under this section shall be galvanized unless noted otherwise on the Contract Drawings. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

2.02 WELD ELECTRODES

A. Weld rod shall conform to AWS E70XX grade.

PART 3 EXECUTION

3.01 FABRICATION

A. Fabricate products in a fully equipped facility capable of producing a high grade of metal fabrication work. All work shall be straight and true, and free from warpage and other defects. Joints, covers, copes, and miters shall be accurately and neatly cut, machined, field, and fitted.

B. Carry out bolting and welding in accordance with latest approved methods, with due consideration for strength and appearance of finished product. All welding shall be done by certified welders.

C. All steel will be free from imperfections, dirt, loose scale, paint, oil, or other foreign substances.

D. All material shall be fabricated to within + or - 1/8 inch of their theoretical dimensions as shown on the drawings.

E. Holes for bolts shall be located as shown on the Drawings and shall be drilled 1/8" in diameter larger than the galvanized bolt.

F. All fabrication under this section shall be hot dipped galvanized in accordance with ASTM Specifications A-123 and A-153, unless noted otherwise on the Contract Documents

G. Prior to fabricating any structural steel members, CONTRACTOR shall confirm the exact field measurements of each unit to account for the subtle changes of individual unit's field condition.

3.02 INSTALLATION

A. Store materials on skids, not on ground, in such a fashion as to prevent bending, twisting, or similar damage. Do not dump steel off truck.

B. Clean installed work from weld spatter, dirt and other foreign materials. Protect installed work as required from damage by subsequent building operations.

C. Joints are to be square, tight, and well-fastened with all members assembled in accordance with the Contract Drawings.

3.03 DEFECTIVE WORK

A. Any parts damaged or improperly fabricated shall be removed and replaced or corrected as directed by the ENGINEER at no additional cost to the OWNER.

END OF SECTION

SECTION 05 50 13

MISCELLANEOUS METALS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this Section, without limiting the generality thereof, consists of manufacturing or shop-fabricating and installation metal elements itemized below including all materials, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:

1. Miscellaneous angles and brackets
2. Structural bolts, washers and nuts
3. Machine bolts, washers and nuts
4. Anchor and expansion bolts
5. Stainless Steel (SS) pins, plates, connections and fasteners
6. Eye bolts
7. Fabricated steel elements
8. Pipe hangers and pipe clamps
9. Chains and shackles
10. Miscellaneous hardware not otherwise identified

B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Concrete under REINFORCED CONCRETE, SECTION 03 31 30.
2. Timber curb and timber rub rail under HEAVY TIMBER CONSTRUCTION, SECTION 06 13 00.
3. Timber Treatment under TIMBER TREATMENT, SECTION 06 13 00.01
4. Dockwall and Anchor Walls under STEEL COMBINATION DOCKWALL, SECTION 35 41 16
5. Bollards under MARINE BOLLARDS AND CLEATS, SECTION 35 59 33.

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.03 QUALITY ASSURANCE

A. Except as noted elsewhere, work shall conform to the following codes and standards:

1. American Society for Testing and Materials (ASTM), latest edition.

2. American Welding Society (AWS)
3. American Institute of Steel Construction (AISC), latest edition.
4. American Institute of Timber Construction (AITC)
5. American Concrete Institute (ACI)
6. American Wood-Preservers Association (AWPA)

1.04 SUBMITTALS

A. Submit for approval prior to fabrication all information necessary for the fabrication of the component parts. Indicate size and weight of members, type and location of shop and field connections, and the type, size, and extent of all welds, and welding sequences. Use American Welding Society welding symbols. Approval of shop drawings will be for size and arrangement of principal and auxiliary members and strength of connections. Any errors in dimensions shown on shop drawing shall be the responsibility of the CONTRACTOR.

B. Certificate of compliance with applicable ASTM specifications for all galvanized items shall be submitted to the ENGINEER with all materials delivered to the fabricator or site.

C. Manufacturer's literature, specifications, and certification of compliance with applicable ASTM specifications for all fasteners, wire rope, chains, shackles, expansion bolts, and other connection items identified within the contract drawings.

D. The CONTRACTOR shall use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Each welder shall be certified for the particular work, prior to commencing the work which must be accomplished.

E. Upon completion of this portion of the work, and as a condition of its acceptance, the CONTRACTOR shall deliver to the ENGINEER a letter signed by an official of the metal fabricating firm or firms certifying that all fabricated metal has been fabricated in complete accordance with this Section of these specifications.

F. Name and address of Independent Testing Laboratory for approval by ENGINEER.

G. List of all other hardware with quantities and material specifications.

1.05 PRODUCT HANDLING

A. All materials shall be delivered, stored, and handled with care to prevent damage to any material or material coating. Material damaged or with damaged coating will be rejected and replaced at no additional cost to the OWNER.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural steel shall conform to ASTM A36 unless otherwise noted.

B. All non stainless steel items under this section shall be galvanized unless noted otherwise on the Contract Drawings. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

C. All bolts and nuts for timber and/or composite materials shall conform to ASTM A307, Gr. A for Mild Steel Bolts unless otherwise noted and shall be Hot Dipped Galvanized according to ASTM Specifications A-123 and A-153.

D. All bolts and nuts for steel connections shall conform to ASTM F3125, Grade A325 for Steel Bolts with manufacturer markings that indicate as such unless otherwise noted.

E. Threaded rod anchors shall conform to F1554 Grade 55 unless otherwise noted.

F. All chains, cable, shackles, and connecting links shall be the size and capacity shown on the drawings.

G. Welding rods shall conform to AWS E70XX grade. Sizes shall be as indicated on the drawings.

PART 3 EXECUTION

3.01 FABRICATION

A. Fabrication shall conform to AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

B. Workmanship shall be equal to standard commercial practice.

C. All materials shall be clean and straight. Each assembly shall be accurately fabricated to the lines and dimensions called for and shall be free from undue twists, bends, warping, distortion, and other irregularities.

D. Fabricate products in a fully equipped facility capable of producing a high grade of metal fabrication work. All work shall be straight and true, and free from warpage and other defects. Joints, covers, copes, and miters shall be accurately and neatly cut, machined, field, and fitted.

E. Carry out bolting and welding in accordance with latest approved methods, with due consideration for strength and appearance of finished product. All welding shall be done by certified welders.

F. All steel shall be free from imperfections, dirt, loose scale, paint, oil, or other foreign substances.

G. All material shall be fabricated to within + or - 1/8 inch of their theoretical dimensions as shown on the drawings.

3.02 INSTALLATION

A. Installation shall conform to AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.

B. Parts covered by this specification shall be installed in the work as shown on the drawings.

C. No cutting or burning of steel shall be done to install fasteners without approval of the ENGINEER.

D. All epoxy anchors shall be installed fully in accordance with manufacturer’s recommendations including hole drilling, cleaning and anchor installation.

E. Store materials on skids, not on ground, in such a fashion as to prevent bending, twisting, or similar damage. Do not dump steel off truck.

F. Clean installed work from weld spatter, dirt and other foreign materials. Protect installed work as required from damage by subsequent building operations.

G. Joints are to be square, tight, and well-fastened with all members assembled in accordance with the Contract Drawings.

3.03 HOT DIP GALVANIZING

A. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

B. Repair of hot dip galvanizing shall be using zinc rich paint. Zinc rich paint shall be an organic zinc-rich coating containing 95% metallic zinc, by weight in the dried film.

3.04 DEFECTIVE WORK

A. The following shall be grounds for rejection and shall be removed and replaced or corrected as directed by the ENGINEER at no additional cost to the OWNER:

1. Any damaged or improperly fabricated parts.
2. Any parts improperly installed in the work.
3. Any items found not to have the proper coating.
4. Otherwise not according to Contract Documents.

END OF SECTION

SECTION 06 13 00

HEAVY TIMBER CONSTRUCTION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials itemized under MATERIALS in this Section, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:

1. Supply and installation of timber fender

2. Supply and installation of timber curb

B. Should Drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Fasteners under MISCELLANEOUS METALS, SECTION 05 50 13

2. Timber Treatment under TIMBER TREATMENT, SECTION 06 13 00.01.

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.03 QUALITY ASSURANCE

A. Except as noted all work shall conform to the latest editions of the following codes, specifications and standards:

1. Southern Pine Inspection Bureau (SPIB)

2. West Coast Lumber Inspection Bureau (WCLIB)

3. Western Wood Products Association (WWPA)

4. National Forest Products Association (NFPA)

5. American Society for Testing and Materials (ASTM)

6. Commonwealth of Massachusetts State Building Code (CMSBC)

7. American Institute of Timber Construction (AITC)

1.04 SUBMITTALS

A. Certification of timber species.

B. Certification of timber treatment

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All timber shall be stored in stacks such that there is an air space beneath the material, and situated to prevent the timber from being exposed to standing water.

B. The material shall be stored on site in an area which will be designated by the OWNER.

C. Timber shall be handled in an approved manner such that the material will not be damaged.

PART 2 PRODUCTS

2.01 MATERIALS

A. Unless otherwise specified on the Contract Drawings, all timber to be used shall be No. 2 dense SR Southern Pine as graded by SPIB and with design values per NFPA National Design Specification or the equivalent for Douglas Fir as graded by WCLIB and WWPA.

B. All timber shall be new and supplied with nominal dimensions unless otherwise noted.

C. All timber fasteners shall meet ASTM A-307 and shall be hot dipped galvanized in accordance with ASTM A-123 and A-153

D. All timber shall be treated in conformance with TIMBER TREATMENT, SECTION 06 13 00.01.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to installation all demolition affecting the new work shall be completed.

3.02 INSTALLATION

A. Joints are to be square, tight and well-fastened with all members assembled in accordance with the Contract Drawings.

B. Holes for bolts shall be drilled the same size as the bolt before galvanizing. Holes shall be swabbed with 2 coats of sealing compound as specified herein before installing the bolts.

C. Bolts shall be tightened to provide a solid connection. No more than 1 washer shall be installed under the bolt head or nut. Bolt threads shall project no more than one bolt diameter beyond the nut.

D. All timber shall be cut and fit in such a manner as to have full bearing over the entire contact surface.

E. All cut faces of timber shall be coated with a minimum of 2 coats of sealing compound as specified herein before installation.

END OF SECTION

SECTION 06 13 00.01

TIMBER TREATMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.02 SCOPE OF WORK

A. Work under this Section, without limiting the generality thereof, consists of the furnishing and installation of all materials itemized under MATERIALS in this Section, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:

1. The treatment of timber members with a wood preservative.
2. The field application of all timber subject to field cutting.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Timber under HEAVY TIMBER CONSTRUCTION, SECTION 06 13 00.

1.04 QUALITY ASSURANCE

A. Except as noted all work shall conform to the latest editions of the following codes, specifications, and standards:

1. American Society for Testing and Materials (ASTM) D-25.
2. American Wood Preservatives Association (AWPA).

PART 2 PRODUCTS

2.01 MATERIALS

A. All new timber members shall be treated in accordance with AWPA Standards for material in use category UC4C.

B. Creosote timber treatment is PROHIBITED.

PART 3 EXECUTION

3.01 Prior to treatment all dimension lumber shall be kiln-dried. Conditioning by heating is not permitted.

3.02 Sealing compound for treatment of field cuts and drilled holes shall be two (2) coats of copper naphthenate meeting AWPA standard P8.

END OF SECTION

SECTION 31 20 00

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Excavating, separating, hauling, stockpiling, backfilling, compacting, and grading of soils. The WORK of this Section may pertain in whole or in part to site filling and grading and construction of site access roads. The section also includes dewatering.

1.02 RELATED SECTIONS

A. Section 02 10 00 – Site Preparation.

B. Section 32 90 00 - Final Landscaping.

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) standards:

1. ASTM D 698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

2. ASTM D 1556, Standard Test Method for Density and Unit Weight of Soil in-Place by the Sand-Cone Method.

3. ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 [2,700 kN-m/m^3]).

4. ASTM D 2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.

5. ASTM D 2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

6. ASTM D 4220, Standard Practices for Preserving and Transporting Soil Samples.

7. ASTM D 4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

8. ASTM D 6913, Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

9. ASTM D 6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

10. ASTM D 7928, Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

B. Latest edition of the Wisconsin Department of Transportation Standard Specification for Construction.

B. OSHA 29 CFR Part 1926, Occupational Safety and Health Standards - Excavations.

1.04 SUBMITTALS

A. Not used.

1.05 DUST & MUD CONTROL

A. Control dust at the Site by moistening exposed surfaces of dry soil or other approved methods in accordance with the perimeter air monitoring work plan or as directed by the Owners Representative.

B. Do not track mud off the Site or onto temporary access roads. Immediately remove mud from any/all public roadways and temporary access roads at no cost to the Owner.

PART 2 - PRODUCTS

2.01 CLAY

A. Clay soils consist of natural soil classified as CL or CH, and free from wood, peat, rocks larger than 4 inches, or other unsuitable material, obtained from on-site dredging activities or from off-site sources.

B. Clay for use in detention basin clay liners shall be managed to keep it clean at all times. CONTRACTOR shall not mix with other site soils.

2.02 MARINE STRUCTURAL FILL

A. Clean soils consisting of well-graded sand, well-graded sand and gravel, well-graded crushed stone or gravel, or other approved granular material, of 2 in. maximum size, free from organic and deleterious materials. Classified as GW, GP, SW, or SP in Unified Soil Classification System.

B. For granular fill, maximum fines content shall be 20% passing No. 200 sieve.

2.03 MARINE AGGREGATE BACKFILL

A. Marine stone fill placed as backfill behind the sheetpile wall shall consist of a crushed stone, crushed concrete, reclaimed asphalt, reprocessed material, or blended material in conformance with WisDOT Standard Specification 305.2.2.1, with a gradation conforming to 1-1/4 inch or ¾ inch diameter.

2.04 MARINE STONE FILL

A. Marine stone fill placed in boat slip or bay north of site shall consist of clean aggregate material obtained from a local borrow source approved by ENGINEER. Maximum rock or stone size not to exceed 12 inches in diameter.

B. Broken concrete from on site may be used for marine stone fill provided pieces do not exceed 24 inches in largest dimension.

2.05 BREAKER RUN

A. Material shall be clean, sound, hard, dense, durable, field or quarry stone which is free from seams, cracks, or other structural defects. It shall be angular material from shot rock (blasted) or crushed rock having substantially all face of which have resulted from artificial crushing.

B. Gradation: Furnish stone or concrete processed through a primary crusher set to produce material predominantly 6 inches or less in at least one dimension, and which is not further screened or crushed

2.06 AGGREGATE BASE COURSE

A. Material shall be clean, sound, hard, dense, durable, field or quarry stone which is free from seams, cracks, or other structural defects. It shall be angular material from shot rock (blasted) or crushed rock having substantially all face of which have resulted from artificial crushing. Material shall conform to WisDOT Section 305.

B. Only acceptable material is crushed limestone, crushed concrete is not allowed.

C. Aggregate Gradation Requirements

D. Gradation: 1 ¼ inch material – WisDOT Section 305.

2.07 TOPSOIL

A. In accordance with Section 32 90 00.

PART 3 - EXECUTION

3.01 PREPARATION

A. Preparation in accordance with Section 01 89 00.

3.02 STOCKPILING

A. Imported and/or excavated material shall be stockpiled in designated areas. CONTRACTOR shall coordinate stockpile and access locations with OWNER's use. CONTRACTOR will maintain all access roads to the stockpile in good driving condition.

B. Excavated or imported materials shall be stockpiled free of incompatible soil, clearing debris, or other objectionable materials.

C. Stockpiles shall be graded to drain and a temporary seeding applied as slope achieve final grades. Any area idle for a period of 30 days shall be seeded or protected from erosion in suitable fashion.

3.03 PLACEMENT AND GRADING

A. Place general fill and structural fill to the lines and grades, to required levels, profiles, contours, and elevations.

B. Structural fill for subgrade shall be placed and compacted in uniform lifts not exceeding 8-inches in thickness and compacted to 95% of modified Proctor.

C. Soils obtained from dredging activities shall be moisture conditioned as necessary to meet compaction requirements. This may include spreading and discing soils to allow soils to dry or by adding lime or cement at CONTRACTOR'S discretion. No additional compensation will be made for moisture conditioning soils.

D. Clay liner for detention ponds shall be placed in lifts not exceeding 6-inches in thickness and compacted to 95% of standard Proctor at a moisture content at or above optimum.

E. General fill shall be placed in uniform lifts and compacted to support the construction equipment being used to move and place the fill. This applies to green space areas and diversion berms for surface water control.

F. Breaker run shall be placed in lifts no greater than 16 inches and compacted with a vibratory drum roller.

3.04 GRADE DOCUMENTATION

A. In accordance with Section 01 71 23 – Field Engineering and Surveying.

3.05 PUMPING AND DRAINAGE

A. At all times during construction, maintain and operate proper equipment and facilities to remove all water entering excavations and keep such excavations dry so as to obtain a satisfactory subgrade allowing construction.

B. CONTRACTOR shall grade excavations and surrounding areas to minimize ponding and direct drainage to common extraction location. Diversions shall be used to minimize surface water flow into the construction area.

3.06 CLEANUP AND DISPOSAL OF DEBRIS

A. Remove and dispose of surplus materials and debris from site as instructed by the OWNER.

3.07 FIELD QUALITY CONTROL

A. Field quality assurance inspection and testing will be performed by the CQA technician.

B. Where compaction of a material is required, provide access and time for CQA technician to complete testing.

C. If tests indicate WORK does not meet specified requirements, remove WORK, replace, and retest at CONTRACTOR's expense.

D. Testing frequencies for construction quality assurance are defined in Table 1 below. Test locations shall be selected at random by the Engineer's representatives.

Table 1 - Testing Frequency for Construction Quality Assurance

Test	ASTM Standard	Frequency
Grain Size	D 6913	1 sample for every 5,000 cyd or less
Moisture Density Curve	D 1557	5 pt curve for every 5,000 cyd or less of material placed
In-Place Density and Water Content	D 6938	1 test for every 1,000 cyd placed

END OF SECTION

SECTION 31 23 16.13

TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavate trenches for utilities to locations as shown on the Drawings.

B. Compacted bedding and compacted fill over utilities to subgrade elevations.

C. Compaction requirements as per Section 31 20 00, and as approved by the ENGINEER.

D. Dewatering system as warranted by the site conditions to perform timely and safe progress of the work.

1.02 REFERENCES

A. ANSI/ASTM C136: Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D1557: Tests for Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb (4.54 kg) Rammer and 18-inch (457 mm) Drop.

C. ANSI/ASTM D1556: Test Method for Density of Soil in Place by Sand-Cone Method.

D. ANSI/ASTM D2922: Density of Soil and Soil Aggregate in Place by Nuclear Methods.

E. Latest revision of the Wisconsin Department of Transportation (WisDOT) Standard Specifications for Highway and Structure Construction.

1.03 FIELD MEASUREMENTS

A. ENGINEER to verify the survey benchmark and intended elevations for the work are as shown on Drawings.

1.04 MEAUREMENT AND PAYMENT

A. Measurement and payment shall be in accordance with Section 01 20 00.

PART 2 PRODUCTS

2.01 BEDDING AND BACKFILL MATERIALS

A. Bedding material for storm sewer, sanitary sewer and water main, in general, shall consist of WisDot Grade 1 Granular Backfill. While some small amounts of clay or silt will be acceptable in the material, it shall be substantially free of rocks, sticks, boulders, rubbish, muck, and other debris which could cause damage to the pipe. Bedding material which contains frozen chunks shall not be used. WisDOT Base Aggregate Dense, Gradation 2 material shall be used in wet conditions, only after prior written approval is obtained from the ENGINEER.

B. Unless otherwise called for on the Drawings, or when directed by the ENGINEER, material excavated from the trench may be used for backfill, provided that it consists of sand, loam, or other suitable material. WisDOT Grade 1 Granular Backfill shall be used

as backfill under the street, sidewalk, curb, parking lot and adjacent to building foundations.

C. Unstable materials containing peat or other organics, or materials which contain large amounts of refuse, broken pavement, boulders, roots, stumps, or other debris, shall not be incorporated into the backfill, and shall be disposed of offsite at no extra cost to the OWNER.

D. WisDOT Base Aggregate Dense, Gradation 2 shall be used for backfilling trench undercuts or for trench stabilization, after obtaining prior written approval of the ENGINEER.

E. Trench backfill under roadway influence shall be placed, up to the bottom of subbase.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify fill materials to be reused are acceptable.

B. CONTRACTOR to obtain prior written approval and certification of borrow sources from the ENGINEER.

3.02 PREPARATION

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

B. Maintain and protect existing utilities remaining, which pass through work area.

C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

D. Protect benchmarks, existing structures, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

E. Protect above and below grade utilities which are to remain.

F. Cut out soft areas of subgrade incapable of in situ compaction. Backfill with WisDOT Grade 1 Granular Backfill and compact to density equal to or greater than requirements for subsequent backfill material.

G. CONTRACTOR shall be allowed for a trench width at bottom of 36 inches (for all sizes of pipes) and four inches below the underside of the pipe barrel for soils. CONTRACTOR shall comply with all rules and regulations and precautions laid out by WI OSHA, and by utility agencies for a safe operation. Any additional excavation outside the limits, and installing bedding and backfill to replace excessive trench excavation shall not be paid for separately, and CONTRACTOR to include such costs in other pay items.

H. CONTRACTOR shall determine prior to the bid and satisfy himself/herself to the extent of dewatering necessary as based on site conditions and evaluation of soil boring information (see Geotechnical Data Report). Dewatering shall not be a separate pay item and cost of all dewatering under the construction of this project shall be deemed to have been included in other pay items.

I. CONTRACTOR shall not be allowed more than 200 linear feet of open trench at one time. Under unusual circumstances, the ENGINEER may authorize more than 200 linear

feet of trench to be open, provided that pedestrian and driveway crossings are maintained at intervals of not more than 200 feet and that not more than one street intersection is closed to traffic.

J. During construction, existing culverts may have to be removed temporarily. CONTRACTOR to exercise care in removing and reinstalling the existing culvert at their previous grade and alignment. If existing culvert is damaged during removal and replacement is required, CONTRACTOR shall replace with new pipe of the same size and length.

K. All costs to remove, salvage and reuse the existing culverts and installation to the same grade and location and replace in case of damage, shall not be paid separately, but will be included in other pay items in the bid schedule.

L. Any existing culvert which is predetermined to be in poor condition, the CONTRACTOR shall bring to the ENGINEER's attention prior to removal. ENGINEER shall decide and approve in writing to replace the culvert by a new culvert pipe of the same size and material. Payment for this item shall be paid as special case at the Contract Unit Price in the Bid Schedule.

M. Where WisDOT Base Aggregate Dense, Gradation 2 bedding is used, bedding shall be entirely covered with geotextile in accordance with the latest version of the WisDOT Standard Specifications for Highway and Structure Construction. Any seams or splices shall have a minimum two (2) foot overlap.

3.03 EXCAVATION

A. Excavate subsoil required for storm sewer, sanitary sewer, water, gas, and electrical conduit piping to municipal utilities.

B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection per trench detail on drawings.

C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

D. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

E. Remove lumped subsoil, boulders, and rock.

F. Correct unauthorized excavation at no cost to OWNER.

G. Correct areas over-excavated by error.

3.04 BEDDING

A. Support pipe and conduit during placement and compaction of bedding fill.

3.05 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen material.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Granular Fill: Place and compact materials in continuous layers not exceeding 12" loose depth.

D. Maintain optimum moisture content of backfill materials to attain required compaction density.

E. Stockpile surplus backfill materials as directed by the ENGINEER.

F. Employ a placement method that does not disturb or damage utility conduits in the trench.

G. Compact material in accordance with Section 31 20 00.

3.06 TOLERANCES

A. The upper limits of backfill shall be top of subgrade under roadways (approaches, sidewalks, etc.). In other areas, upper limit shall be bottom of topsoil.

3.07 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by the ENGINEER.

B. Tests and analysis of fill material will be performed in accordance with the Specifications.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to OWNER, and as approved by the ENGINEER.

END OF SECTION

SECTION 31 23 23

FILL AND BACKFILL

PART 1 GENERAL

1.01 WORK INCLUDES

A. Materials and placement methods for fill to raise site grades and backfill behind dockwall and other structures.

B. Miscellaneous fill or backfill not specifically covered in other Sections.

1.02 RELATED SPECIFICATIONS

A. Section 31 20 00 – Earthwork.

B. Section 31 25 00 – Erosion and Sedimentation Control.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit the following data for ENGINEER review:

1. Tests of stockpiled embankment soil – Identify locations where materials are being stockpiled.

2. Test data of all imported materials, indicating proposed materials satisfy the requirement of this Specification.

3. Results of CONTRACTOR Quality Control Tests and Measurements.

4. Permits that are required by State and other local governing authorities for parts of the Work herein specified.

5. Description of all equipment and procedures proposed for the Work of this Specification.

1.04 REFERENCES

A. The following is a list of standards, which may be referenced in this Specification:

1. ASTM International (ASTM):

a. ASTM C33 – Standard Specification for Concrete Aggregates.

b. ASTM C88 – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

c. ASTM C117 – Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

d. ASTM C127 – Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.

e. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

f. ASTM D75 – Standard Practice for Sampling Aggregates.

g. ASTM D422 – Test Method for Particle-Size Analysis of Soils.

h. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

i. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

j. ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

k. ASTM D2216 – Laboratory Determination of Water (Moisture) Content of Soil Rock, and Soil-Aggregate Mixtures.

l. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

m. ASTM D2488 – Practice for Description and Identification of Soils (Visual-Manual Procedure).

n. ASTM D2922 / D3017 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods.

o. ASTM D4959 – Test Method for Determination of Water Content (Moisture) by Direct Heating Method (Not Referenced).

p. ASTM D2937 – Test method for Density of Soil in Place by the Drive-Cylinder Method (Not Referenced).

q. ASTM D3740 – Practice for the Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction (Not Referenced).

r. ASTM D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

s. ASTM D4254 – Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

t. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, Plasticity Index of Soils.

u. ASTM D5084 – Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Not Referenced).

v. ASTM D6913 – Test Method for Particle-Size Analysis of Soils.

w. ASTM D6951 – Test Method for Dynamic Cone Penetration Test.

2. American Association of State Highway and Transportation Officials (AASHTO):

a. AASHTO T272 – Standard Method of Test for Family of Curves – One-Point Method.

3. Wisconsin Department of Transportation Standard Specifications for Construction (WisDOT).

1.05 DEFINITIONS

A. Borrow Material: Material from required excavations or from designated borrow areas.

B. Certified/Certification: Reviewed, approved, stamped, and signed by a Professional Engineer registered in the State of Wisconsin.

C. Completed Course: A course or layer that is ready for next layer or next phase of the Work.

D. Coverage: One coverage is defined as the requirement for successive trips of a piece of compaction equipment, which by means of sufficient overlap will ensure contact on the entire surface of the layer by the equipment.

E. Deleterious Materials: Organic matter, trash, rubbish, debris, oversize materials, and soluble materials.

F. Fines: Material passing the No. 200 sieve.

G. Imported Material: Material obtained from sources off site.

H. Lift: Loose (uncompacted) layer of material.

I. Optimum Water Content: The water content of a material corresponding to its maximum dry unit weight when compacted in accordance with specified laboratory procedure.

J. Oversize Materials: Soil particles, soil clods, sedimentary fragments, rocks, and other materials having a maximum dimension in excess of the specified limits.

K. Particle Size: The size of a particle before compaction measured parallel to its longest dimension.

L. Passes: The process of operating compaction equipment over the fill surface such that the primary compaction element(s) comes in contact with the entire lift surface. When using a single-drum roller (towed or self-propelled), one pass of the equipment is considered to be one pass of the area contacted.

M. Processed Borrow: Borrow that is physically modified by CONTRACTOR to derive a material that is suitable for a specific use.

N. Relative Compaction: The ratio, expressed as a percentage of the dry unit weight obtained in the fill after the specified compaction has been performed, to the maximum dry unit weight obtained from the specified laboratory compaction standard.

O. Field Testing:

1. Field testing will be performed by the CONTRACTOR and checked by the ENGINEER for conformance with these Specifications. Where any non-conformance is revealed, further testing will be performed. Corrective measures, to the extent of complete replacement of material, shall be made by the CONTRACTOR until conformance is achieved.

2. All testing equipment including the nuclear gauge will be calibrated in accordance with manufacturer’s specifications under the review of the ENGINEER. The ENGINEER will retain all calibration records

PART 2 PRODUCTS

2.01 STRUCTURAL BACKFILL

A. Select or processed granular borrow material salvaged from on-site excavation or imported from an off-site location.

B. Maximum particle size of 3 inches.

C. Minimum fines content of 10 percent.

D. Allowable Unified Soil Classification System (USCS) classifications: SP-SM, SW-SM, SM, SM-SC, SC, GP-GM and GM.

E. Free of ice, frozen soil, roots, organics and other deleterious materials.

F. Blend adequately during placement such that the compacted backfill forms a uniform, homogeneous, dense, void free, and relatively impervious compacted material.

2.02 RANDOM FILL

A. Granular borrow material salvaged from on-site excavations.

B. Maximum particle size of 6 inches.

C. Minimum and maximum fines content of 10 and 50 percent, respectively.

D. Allowable Unified Soil Classification System (USCS) classifications: SP-SM, SW-SM, SM, SM-SC, SC, GP-GM and GM.

E. Free of ice, frozen soil, roots, organics, construction debris, and other deleterious materials.

2.03 ¾-INCH DENSE GRADED BASE

A. Provide aggregate conforming to WISDOT Section 305 for crushed stone, crushed gravel, crushed concrete, reprocessed material, or blended material. The 3/4-inch Dense Graded Base shall conform to the following gradation limits of ASTM D448:

U.S Standard Sieve Size	Percent Passing by Weight
1-1/2-inch	100
1-inch	100
3/4-inch	95-100
3/8-inch	50-90
No. 4	35-70
No. 10	15-55
No. 40	10-35
No. 200	5.0 - 15

B. The fraction of the material finer than the No. 16 sieve shall be classified as non-plastic based on Atterberg Limits (ASTM D4318).

C. Material shall conform to the requirements of ASTM C33 for soundness and deleterious substances.

2.04 1 ¼-INCH DENSE GRADED BASE

A. Provide aggregate conforming to WISDOT Section 3.5 for crushed stone, crushed gravel, crushed concrete, reprocessed material, or blended material. The 1-1/4-inch Dense Graded Base shall conform to the following gradation limits of ASTM D448:

U.S Standard Sieve Size	Percent Passing by Weight
1 ¼ -inch	95-100
3/4-inch	70-93
3/8-inch	42-80
No. 4	25-63

No. 10	16-48
No. 40	8-28
No. 200	2.0-12

B. The fraction of the material finer than the No. 16 sieve shall be classified as non-plastic based on Atterberg Limits (ASTM D4318).

C. Material shall conform to the requirements of ASTM C33 for soundness and deleterious substances.

2.05 WATER FOR MOISTURE CONDITIONING

A. Free of hazardous or toxic contaminates, or contaminants deleterious to proper compaction.

2.06 MOISTURE CONDITIONING AND COMPACTION EQUIPMENT

A. Dedicated compaction equipment of suitable type, capable of achieving the specified requirements, and which provides a satisfactory uniform, homogeneous fill.

B. Hauling or placement equipment shall not be considered compaction equipment except under special circumstances as specified below.

C. Hand-operated Equipment:

1. For use in confined areas not accessible to regular compaction equipment or where regular compaction equipment might damage structures or piping.
2. Subject to the approval of the ENGINEER.

D. Type 1 Roller (granular materials):

1. Heavy-duty, self-propelled, steel drum vibratory roller.
2. At least 12,000 pounds static weight.
3. Vertical applied dynamic force: At least 4,000 pounds per foot of drum width when operated between 1,300 and 1,800 vibrations per minute.
4. Do not operate at speeds exceeding 3 miles per hour.

E. Vibratory Plate Compactor (granular materials adjacent to structures and piping, and in tight, restricted areas):

1. Minimum static weight of 270 pounds.
2. Minimum dynamic force of 1,000 pounds.

PART 3 EXECUTION

3.01 GENERAL

A. Remove protective coating immediately before placing any fill and prepare foundation according to Section 31 20 00 – Earthwork.

B. Keep placement surfaces free of ponded water, debris, and foreign material during placement and compaction of fill and backfill materials.

C. Prior to placing fill and backfill materials, the base of the excavation or underlying layer shall be inspected and approved by the ENGINEER. A 48-hour advance notice shall be

provided to the ENGINEER on intended foundation cleanup and placement of all backfill materials to permit inspection and testing.

D. All operations including, but not limited to, loading, transporting, dumping, spreading, moisture conditioning and compacting materials shall be conducted in a manner to prevent contamination and segregation of embankment zones. All contaminated or segregated materials shall be removed and replaced by the CONTRACTOR. All operations shall be conducted to prevent breakdown of particles. The distribution of materials throughout an embankment zone shall be such that each lift is free from lenses, pockets, streaks or layers of material differing substantially in texture or gradation from the surrounding material.

E. Compact each lift at the specified moisture content, using the specified equipment, and to specified densities, prior to placing succeeding lifts. When the test results indicate that compaction water content or relative compaction is not in conformance with the specified limits, immediate adjustments in procedures shall be made by the CONTRACTOR as necessary to conform to the specified limits. Re-working to attain the specified limits may include reconditioning, re-rolling, re-handling, removal, or combinations of these procedures.

F. Slope lifts only where necessary to conform to final grades and as necessary to keep placement surfaces drained of water.

G. Slope transverse or longitudinal joints between embankment zones or separate fill areas no steeper than 2 horizontal to 1 vertical (2H:1V), unless otherwise shown or approved by ENGINEER. Bond fill and backfill at joints by excavating shallow benches to expose 12 to 18 inches (measured vertically) of firm, moist, dense surface just prior to placing the next lift of adjacent embankment.

H. The maximum allowable particle size delivered in the fill and backfill at placement location and prior to any compaction shall be no larger than the maximum specified in Part 2 – PRODUCTS of this Specification.

I. Process spoils by blading, disking, harrowing, or other ENGINEER-approved methods as necessary to provide sufficient disaggregation and blending of fill and backfill.

J. Do not place fill on areas consisting of organic soil, debris, or other soft and yielding material. Do not place fill or backfill if fill or backfill material is frozen, covered with snow, or if surface upon which fill or backfill is to be placed is frozen or standing water.

K. Provided neither the fill or backfill or surface upon which the fill or backfill is to be placed is unfrozen, do not place fill when the air temperature is below +25° F. If the air temperature is above +25° F, but below +32° F, fill can be placed as long as the average daytime temperature exceeds +35° F.

L. When the weather endangers the quality of the fill material being placed, the placement of material shall be halted until weather conditions are satisfactory. Fill shall not be placed during heavy rains or during falling snow. Any previously compacted material, which has become too wet or in any way unsuitable, as determined by the ENGINEER or OWNER, shall be removed, and replaced with new fill material.

M. Tolerances:

1. Final Lines and Grades:

   a. Within 0.1 foot unless dimensions or grades are shown or specified otherwise.

2. Grade to establish and maintain slopes and drainage as shown on Drawings. Reverse slopes are not permitted.

N. Settlement:

1. Correct and repair any subsequent damage to structures, slabs, piping, and other facilities caused by settlement of fill or backfill.

3.02 MOISTURE CONDITIONING AND PROCESSING

A. Perform moisture conditioning of fill materials as necessary prior to placement. Maintain moisture content of delivered materials and compact materials in the lift to produce the specified fill characteristics.

B. Provide supplemental sprinkling on the fill to keep material within specified moisture content limits throughout the placement and compaction process, and to preserve moisture in completed courses until placement of overlying courses.

C. Blend or process material by disking, blading, harrowing, or other suitable methods, to maintain uniform moisture content throughout the lift.

D. Do not attempt to compact material that contains excessive moisture. Remove or aerate material that becomes too wet by blading, disking, harrowing, or other methods to hasten the drying process.

E. Provide suitable types and numbers of watering and blending equipment to keep pace with fill and backfill placement activities. Provide additional equipment or restrict material placement rates if watering and blending equipment cannot keep pace with fill and backfill placement.

F. Maintain moisture conditions of the fill surface during nights, weekends, holidays, and other periods of temporary work stoppage.

3.03 COMPACTION

A. Compact all material by mechanical means.

B. Terminate material placement and take corrective action prior to resuming material placement if:

1. Tests indicate that compaction or moisture content is not as specified, or

2. Compaction equipment being used is not as specified.

C. Operate compaction equipment in strict accordance with manufacturer’s instructions and recommendations. Maintain equipment to deliver the manufacturer’s rated compaction effort.

D. Where a minimum number of coverages is specified, provide 20 percent overlapping roller passes for each complete roller coverage per lift.

E. Provide suitable numbers of equipment to keep pace with fill and backfill placement activities. Restrict material placement rates if compaction equipment cannot keep pace with fill and backfill placement.

F. Heavy hauling or self-propelled compaction equipment shall not be operated within five (5) feet of any existing or new concrete structure. Special compaction in those areas shall be performed by the methods and to the requirements for compaction in restricted areas for each material type.

3.04 STRUCTURAL BACKFILL

A. Placement:

1. Structural backfill material shall be dumped and spread in level, continuous, approximately horizontal lifts that do not exceed 12 inches thick before compaction, using approved methods and equipment.

2. Structural backfill material from on-site excavations or imported from off-site locations shall be moisture conditioned as necessary. The material placed shall be within the specified compaction water content range prior to placement.

B. Water Content and Compaction Requirements:

1. Field and laboratory tests of the compacted material will be performed by the ENGINEER at selected intervals and structural fill locations to evaluate whether the specified compaction water content and relative compaction requirements are being met. Field testing for compacted unit weight will be performed in accordance with ASTM D1556 and/or ASTM D3017. Relative compaction and water content variation from optimum water content will be compared to the results of ASTM D698.

2. The compaction water content of structural backfill material shall be between 2.0 percent dry of optimum water content and 2.0 percent wet of optimum water content.

3. Structural backfill material shall be compacted to at least 95 percent of the maximum dry unit weight as determined by ASTM D698.

4. Compaction with hand-held power tampers or other approved equipment shall be used in areas that are inaccessible to other self-propelled compactors. Each lift compacted with a hand-held compactor shall be compacted to the minimum specified relative compaction. Lift thickness shall not exceed 6 inches before compaction. Maximum particle size is limited to 3 inches in restricted areas. Materials requiring such compaction shall be compacted using hand-held power tampers, vibrating plate compactors, or walk-behind vibratory rollers to achieve the minimum specified relative compaction.

3.05 RANDOM FILL

A. Placement:

1. Random Fill materials shall be dumped and spread in level, continuous, approximately horizontal lifts that do not exceed 12 inches in thickness before compaction.

B. Water Content and Compaction Requirements:

1. Water shall be added to Random Fill materials as needed to facilitate compaction.

2. Each lift of Random Fill shall be compacted by four (4) passes of an approved self-propelled compactor as specified in Section 2.7 of this Specification or other equipment approved by the ENGINEER or OWNER.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Geotextile Materials for Silt Fence.

B. Materials for Straw Bale Dikes, Erosion Mats, Turbidity Curtains.

C. Preparation and Placement.

1.02 RELATED SECTIONS

A. Section 02 41 00: Demolition

B. Section 32 92 19: Final Landscaping

1.03 REFERENCES

A. Most current version of Wisconsin Department of Transportation (WisDOT) Standard Specifications.

1.04 SUBMITTALS

A. Furnish manufacturer's documentation to the Engineer that the materials meet the requirements listed herein. Provide two copies of the mill certificate, signed by a legal authorized officer from the manufacturer, for each consignment. The mill certificate shall state that the material in that shipment meets the requirements listed herein and provide proof of test results for minimum roll values.

1.05 DELIVERY, HANDLING, AND STORAGE

A. Deliver material to the project site in such quantities and at such times to assure the continuity of the installation. Protect material during on-site storage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sediment Control Fences (Silt Fences).

B. Riprap: Riprap for stone ditch checks shall be a well-graded angular stone having a D50 (median) diameter of 3 inches.

C. Straw Bales: Straw, hay, or other approved material, in good condition, of the size shown on the plans. String-tied; anchored with wood stakes.

D. Erosion Mats.

E. Temporary Mulches: Shall be hay, straw, fiber mats, netting, wood cellulose, bark, wood chips, or other suitable material acceptable to Engineer and shall be reasonably clean and free of noxious weeds and deleterious materials.

F. Turbidity Curtains: Turbidity Curtain shall conform to requirements of WisDOT Standard Specifications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Contractor shall establish and maintain landfill area erosion control features until project is completed and accepted by Owner.

B. Verify that the materials are acceptable to the Engineer.

C. Following general practices shall be used, where applicable:

1. Minimize disturbed areas and sequence work to minimize exposure time.

2. Use temporary vegetation, mulch or other cover to protect areas during construction. Utilize stone check dams, hay bale dikes, or silt fence to trap sediment.

3. Reduce volume and velocity of water crossing disturbed areas by utilizing diversion dams, hay bales, berms, or other facilities.

D. Silt fence and erosion control measures shall be established prior to exposing any erodible material. Site grading and drainage operations are to be conducted in a manner to prevent or lessen excessive soil erosion of construction-site work area.

E. Construction Inspector, CQA Technician, and Engineer have authority to limit surface area of erodible earth material exposed by excavation and placement operations. Contractor shall provide immediate temporary or permanent erosion control measures, when directed. Contractor shall incorporate all permanent erosion control features into project at earliest practicable time to minimize need for temporary controls.

F. Contractor shall manage surface water within construction limits consistent with Engineer-approved Storm Water Control Measures.

3.02 SILT FENCE INSTALLATION

A. Clear alignment of shrubs, trees, boulders, and other debris.

B. Excavate key trench as shown on drawings.

C. Install upright staking at spacing shown on drawings. Eight-foot spacing for fence with nylon netting or wire mesh support, 3-foot spacing with no support.

D. Place silt fence geotextile with support netting or wire fence support (if used) and fasten to staking. Geotextile with support is to extend into key trench, as shown on plans.

E. Backfill and compact key trench.

F. Allow a minimum spacing of 4 feet between silt fence and the toe of soil stockpiles.

3.03 STRAW BALE INSTALLATION

A. Clear alignment of shrubs, trees, boulders, and other debris.

B. Excavate 4-inch deep embedment trench.

C. Place bales and tightly abut the ends of adjacent bales. Fill gaps with straw or hay. Install bales so that bindings are oriented around sides of bales, rather than along top or bottom.

D. Anchor bales by two stakes driven through the bales, at least 8 inches into the ground.

E. Place soil on upslope side or bales, buildup 4 inches above ground.

3.04 MULCH BLANKET INSTALLATION GENERAL

A. Mulch blanket shall meet the requirements of WisDOT Standard Specifications for Highway and Structure Construction. Anchor mulch blanket on upslope and in 6-inch by 6-inch anchor trench or as recommended by the manufacturer when the manufacturer's anchoring requirements are greater.

B. Install mulch blanket in perimeter ditch by centering width of roll along centerline of ditch.

3.05 STONE DITCH CHECKS

A. Stone ditch checks shall be constructed of a well-graded angular stone, with a D50 of 3 inches.

B. Stone ditch checks shall have a minimum top width of 2-feet, measured in the direction of flow, with maximum slopes of 2:1 (2 horizontal to 1 vertical) on the upslope and downslope sides. The maximum height of stone ditch checks is 36 inches.

C. Ditch checks must be installed with the center lower than the sides forming a weir. If this is not done stormwater flows are forced to the edge of the ditch check, thus promoting scour, or out of the channel causing excessive erosion.

D. For added stability, ditch checks shall be keyed 6 inches into soil at base of trench.

E. Install ditch checks at a maximum spacing of 100 feet and upstream of silt fence at all locations of channelized flow.

3.06 TURBIDITY CURTAINS

A. Install turbidity curtains using mechanical or hand methods in accordance with manufacturer's recommendations at the locations indicated on the Drawings.

B. Join sections in such a manner that, when in operation, the sections work effectively as a continuous fence.

C. Secure the curtain and install flotation devices per manufacturer’s specifications.

3.07 INSPECTION AND MAINTENANCE

A. Contractor shall inspect silt fence and other erosion controls at least once per week and within 24 hours of any precipitation event of ½-inch or greater. Inspections will be documented.

B. Any needed repairs or reinforcements documented during the Contractor's inspection, or any inspection performed by the Owner or Owner's Representatives, shall be completed within 12 hours of Contractor notification.

END OF SECTION

SECTION 31 37 00

RIPRAP

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Medium Riprap, in accordance with the Wisconsin Department of Transportation (WisDOT) Standard Specifications.

B. Armor Stone (Extra-Heavy Riprap), in accordance with WisDOT Standard Specifications.

1.02 REFERENCES

A. WisDOT Standard Specifications for Highway and Structure Construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Riprap must be natural stone.

B. Medium Riprap; 12-inch to 18-inch in greatest dimension, with a median size of approximately 15-inches, of well-graded mixture of sizes, free of organic matter, clay, silt, or other deleterious materials.

C. Armor Stone, matching specifications for Extra-Heavy Riprap in the WisDOT Standard Specifications; 24-inch to 36-inch in greatest dimension, with a median size of approximately 30-inches, of well-graded mixture of sizes, free or organic matter, clay, silt, or other deleterious materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that Riprap materials are acceptable to ENGINEER and/or OWNER.

3.02 PLACEMENT

A. Place geotextile filter fabric under all riprap as indicated on Drawings and in accordance with the Specifications.

B. Place geotextile fabric in the key trench at the toe of the slope if the riprap terminates at or below a designated high-water elevation.

C. After the riprap is in place, anchor the geotextile in a second key trench at the top of all slopes.

1. This key trench shall be at a minimum depth of 1.5 feet.

D. Overlap all seams a minimum of 2 feet.

1. If geotextile is laid horizontally, start at the bottom of the slope and shingle lap the layers to direct surface runoff.

E. Protect slopes and adjacent structures during placement.

F. Place Riprap on slopes as shown on Drawings.

1. Begin the riprap in a trench below the toe of the slope and progress upward.

2. Place the individual stones; firmly embed each stone into the slope and interlocked against the adjoining stones.

3. Place random and well broken joints between consecutive rows of stones.

4. Thoroughly compact the riprap as the construction progresses, to present an even, tight finished surface.

G. Slope with mechanical equipment to lines and grades indicated on Drawings. Minimize movement of plain riprap and heavy riprap on geotextile filter fabric. Fill voids between larger pieces of stone with smaller stone, as directed by ENGINEER.

H. Place riprap carefully onto geotextile and do not dump or drop riprap into place.

END OF SECTION

SECTION 31 41 16

STEEL COMBINATION DOCKWALL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Furnishing and delivering:
    a. Steel pipe piles (king piles) for dockwall
    b. Steel sheet piles for dockwall and anchor wall
    c. Steel sheet pile connectors
    d. Wales
    e. Wale Seats
    f. Tie rods and associated hardware including, but not limited to, articulated couplers, couplings, hex nuts, jam nuts, washers (flat/spherical), bearing plates (flat/dished), and grease.
    g. Miscellaneous metals including, but not limited to, bearing plates, washer plates, bolts, washers, and all other hardware associated with the dockwall to make a complete dockwall system as specified in the Contract Documents.
2. Installing and monitoring Deformation Monitoring Points (DMPs).
3. Obstruction removal
4. Installing king piles and sheet piles for dock wall and anchor wall to the specified tip elevations.
5. Supply and installation of king pile fill
6. Installation of wale, tie rods, and associated hardware
7. Excavation, backfill, and compaction associated with the dockwall, anchor wall and tieback system, unless paid under another pay item.
8. Installation of timber curb and timber rub rail
9. Sequencing work to ensure stability of all structures and shoreline at all times

B. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.02 RELATED WORK SPECIFIED ELSEWHERE INCLUDES:

A. The following items of related work are specified and included in other Sections of the Specifications

1. Demolition under DEMOLITION, SECTION 02 41 00.
2. Concrete fill for king piles under REINFORCED CONCRETE, SECTION 03 31 30.

3. Timber curb and timber fender under HEAVY TIMBER CONSTRUCTION, SECTION 06 13 00

4. Excavation and fill under EARTHWORK, SECTION 31 20 00.

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.03 DEFINITIONS

A. Dockwall: the portion of the wall system along the proposed water's edge.

B. Dockwall system: includes all elements inclusive to supporting the dockwall (dockwall elements, tie rods, anchor walls, wales, associated hardware, etc.)

1.04 QUALITY ASSURANCE

A. Except as noted, work shall conform to the following codes and standards, latest edition:

1. ASTM - Specifications for the American Society for Testing and Materials

2. ANSI/AASHTO/AWS - Bridge Welding Code D1.5-88

3. AISC - Specifications of the American Institute of Steel Construction

B. Comply with all rules, regulations, laws and ordinances of the State of Wisconsin and all other federal, state, and local authorities having jurisdiction. All labor, materials, equipment and services necessary to make work comply with such requirements shall be provided without additional cost to Owner.

C. All welding shall be performed by operators who have been previously qualified by tests as prescribed in the "ANSI/AASHTO/AWS Bridge Welding Code D1.5-88". Evidence that welders meet qualification requirements shall be submitted to the Engineer before welding is started.

D. Field Monitoring

1. All piles shall be observed and/or tested prior to installation. Observations and/or testing shall include:

(a) Checking piles for general straightness: Piles with kinks in local areas along the interlock or that have excessive bowing or camber shall be rejected.
(b) Gauging all pile interlocks: Thumbs of interlocks shall be of the proper size to fit into the corresponding interlock openings. Piles whose interlocks are not within acceptable tolerance shall be rejected.
(c) Checking piles for lamination flaws or gas pockets: Piles showing evidence of lamination flaws or gas pockets shall be rejected.

1.05 SUBMITTALS

A. Product Data

1. Steel sheet piles

2. Steel king piles and connectors

3. King pile fill

4. Corrosion inhibiting grease

B. Shop Drawings

1. Dockwall system shop drawings including, but not limited to

a. King pile and steel sheet piling layout for dockwall, anchor wall, and CB60 support wall

b. Combination wall details including details for shop welding submitted for review prior to fabrication.

c. Tie rod layout including splice locations and articulated couplers

d. Wale layout and assembly details including wale seats

e. Shop drawings shall include all quantities, special fabricated corners and cut-outs details for any dockwall penetrations.

2. Tie rod temporary support shop drawings and supporting computations

3. Contractor Dockwall Installation Plan and supporting narrative/ computations

a. Driving plan and schedule for installation of the dockwall.

b. Method of installation of piling including size and type of pile hammer, and temporary systems.

c. Templates and falsework to be used for support and layout of piles during driving.

d. Materials and methods for temporary lateral support of existing structures during pile installation, if required.

e. Sequence of installation for all piles, filling and dredging

C. Quality Assurance/Control

1. Qualification statement for the Contactor's Engineer

2. Pipe pile material, specifications and certifications

3. Steel sheeting material, specifications and certifications.

4. Wale and tie rod material and associated hardware, specifications and certifications

5. Certify that materials are new and meet or exceed specification requirements by submitting a notarized copy of chemical and physical tests results.

6. Welder qualifications

1.06 PROJECT CONDITIONS

A. Site and Subsurface Conditions

1. Subsurface investigation data is contained in the Contract Documents. Prior to submitting a bid, the Contractor shall review the data provided. The subsurface investigation data is made available to the Contractor for information on factual data only at the specific locations given and any interpretation by the Contractor between locations from written text, boring logs or other data shall be at the Contractor's own risk.

2. Interpretation of the subsurface data for purposes of the work of the Contract shall be the sole responsibility of the Contractor. The Contractor should note that the subsurface data pertains only to the conditions at the boring locations at the time of the investigations.

3. The Contractor shall protect existing adjacent property, utilities and structures, and completed work from damage associated with the dockwall system installation. Damage caused by Contractor operations shall be repaired by the Contractor at his own expense.

4. The Contractor should carefully review potential interference from existing surface and subsurface debris, concrete, riprap, seawalls, utilities, dockwalls, timber piles, and any other obstructions encountered, during installation of the piles. While not anticipated to be a problem, an existing ATC transmission line crossed over the path of the proposed dock wall. Contractor should be prepared to take appropriate and adequate measures to remove or work around these interferences and obstructions as necessary for installation of the piles and protection of existing structures.

B. Existing Waterfront Structures within Project Site

1. The existing conditions of the waterfront structures at the site are presented based on GEI's limited understanding of their construction. Existing conditions are presented based on visual observations and available historical information. Investigations have not been performed to validate the accuracy of these historic documents. The Contractor shall perform his own due diligence as necessary to support his operations.

2. The existing waterfront structures within the Project Site site are generally in poor condition and are considered to have little to no live load capacity. This includes the existing dockwall systems and marine dolphins. The Contractor shall not use these structures for temporary support, mooring or berthing of waterborne equipment, or as a means of offloading equipment or materials from/to the water. All staging and stockpiling areas must be setback a minimum of 100-feet from the existing dockwalls.

3. The Contractor shall take extreme care while installing the new dockwall and associated systems within the vicinity of the existing structures. The Contractor shall monitor these existing structures for movement and immediately stop work and notify the Engineer if movement is detected.

C. Existing Waterfront Structures within Flint Hills Resources Site

1. The new dock wall is proposed to connect to the existing bulkhead on the Flint Hills Resources site. No work shall be performed on any abutting property without specific written Notice to Proceed by the Owner.

2. The existing conditions of the waterfront structures at the Flint Hills Resources site are presented based on GEI's limited understanding of their construction. The Contractor shall perform a pre-condition survey of all structures within 50 feet of any work or staging areas prior to any work on the Flint Hills Resources property. At minimum, the pre-condition survey shall consist of a Routine Inspection above and below water complying with the requirements of ASCE MOP 130. The Contractor shall submit a plan describing the pre-condition survey prior to commencing any work for approval by the Owner.

3. The Contractor shall verify allowable live load capacity of the existing bulkhead wall(s) and shall stage and execute the work in a manner that does not exceed the allowable live load capacity at any time.

4. The Contractor shall take extreme care while installing the new dockwall and associated systems within the vicinity of the existing structures. The Contractor shall monitor these existing structures for movement and immediately stop work and notify the Engineer if movement is detected.

5. A post-condition survey of all structures within 50 feet of any work or staging areas shall be performed using the same methodology as the pre-condition survey.

D. Existing Sewer

1. Sheetpile dockwall construction crosses over existing sanitary siphon pipe in easement area at south end of site.

2. Sheets have been designed to provide separation distance of approximately 45 feet above the top of the pipe.

3. Vibration monitoring may be required by OWNER or ENGINEER based on discussions with NEW Water regarding protection of tunnel pipe.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver piles and all required materials in a timely manner to assure continuity of construction of the dockwall.

B. Piles shall be handled, transported, and stacked with care to prevent damage to pile and coating. Damaged piles will be rejected and replaced at no additional cost to the Owner. Piles shall be stored with a space beneath the piles and situated to prevent being exposed to standing water.

C. Materials shall be stored in areas on site or as designated by the Owner

1.08 EXAMINATION OF SITE

A. Inspect the site personally to evaluate the conditions affecting the work. No claim for additional costs will be allowed because of lack of knowledge of any existing conditions discernible from observation at the site, adjoining properties, and available sources of information. Copies of available drawings of existing on-site structures are provided with Existing Site Data as an attachment to the bid documents.

1.09 LINES AND GRADES

A. Layout dockwall alignment and establish all elevations required. Provide and maintain an approved baseline and benchmark located on or close to the work.

B. Employ, within the Contract Price, a licensed Registered Land Surveyor or a Registered Professional Engineer, familiar with this type of work, who shall establish lines and levels.

C. Determine the correct alignment of the dockwall. Establish actual locations of each king pile. Show alignment of dockwall on a drawing in relation to the design location and submit to the Owner within five days after the installation of each 100-feet of dockwall. Include the following on the drawings:

1. Pile numbers and north arrow.

2. Elevation of top and bottom of each king pile to nearest 0.1 foot.

3. Elevation of top and bottom of each sheet pile pair to nearest 0.1 foot.

4. Deviation from plan location in inches, measured to nearest ¼ inch.

D. Submit to the Owner within two weeks after the completion of installing the dockwall, a plan, certified by the Surveyor or Engineer, showing the as-driven alignment of all king piles to the nearest ¼ inch.

1.10 OBSERVATION AND TESTING

A. Full-time observation of installation of all dockwall piles will be performed by the Engineer. Install no piles except in the presence of the Engineer.

B. Cooperate with the Engineer to document all pertinent data relative to the installation of piles. The record for each king pile or sheet pile pair shall include:

1. The date and time of installation.
2. Type and size of hammer.
3. Total penetration, shown by pile tip and top elevation of each sheet pile pair and king pile.
4. Time for each 5-foot of penetration during driving.
5. Depth of changes in hammer stroke or driving energy during driving.
6. Pertinent notes as to unusual behavior during installation.

C. Inspection: Engineer shall have access to work. Contractor shall make available all materials and equipment necessary at all times for purposes of inspection. Contractor shall cooperate with and assist the Engineer's inspection. Inspection by the Engineer may include, but is not necessarily limited to:

1. Condition of piles prior to driving.
2. Condition of the hammer prior to driving.
3. Measurement of penetration resistance.
4. Verification of hammer performance and energy.
5. Condition of piles after driving.

D. Approvals given by the Owner or their Engineer shall not relieve the Contractor of responsibility for performing the work in accordance with the plans and specifications.

1.11 Contractor’s Installation Plan

A. The Contractor shall retain a professional engineer licensed in the State of Wisconsin with experiencing in design and construction of similar project types and sizes.

B. The Contractor’s installation plan shall identify the full sequence of construction and temporary requirements for the partially completed dockwall system. At a minimum, this is anticipated to include, but is not limited to:

1. Sequence of Operations and all equipment
2. Anticipated removal depths of Organic Material behind the dockwall alignment
3. Maximum height differential between fill behind or dredged surface outshore of the cantilevered dockwall system prior to an effective tie back system
4. Other intermediate fill heights as applicable
5. Details of required embankments/fill for the partially completed anchor wall system
6. Tie rod temporary support requirements including, but not limited to:
    a. Tie rods not supported continuously by ground shall be supported by a Contractor designed temporary support system such as pin piles and beams.
    b. Unless tie rods are continuously supported along their length, discrete supports shall not exceed 20-feet on-center along the axis of the tie rod.
    c. Tie rod splices shall be supported by ground or discrete temporary supports.

C. The installation plan shall comply with the installation constraints noted in the Contract Documents.

PART 2 PRODUCTS

2.01 MATERIALS

A. The type, size, and length of steel dockwalls are shown on the Contract Drawings.

B. Tie rods shall be:

1. All tie rods shall conform to ASTM A615 and conform to the size and strength requirements shown on the Contract Drawings. All tie rods shall be epoxy coated to ASTM A775 or hot dip galvanized to ASTM A153.

2. Rods, couplers (conventional and articulated), nuts, washers, dished bearing plates, and corrosion inhibiting grease shall be as manufactured by DYWIDAG Systems International, USA, Inc., Lincoln Park, NJ; Williams Form Engineering Corporation, Grand Rapids, MI; Nucor Skyline; or approved equal.

3. All thread bar accessories shall designed to develop 125-percent of the tie rod ultimate tensile strength.

4. Tie rod system shall include bearing plates, anchor plates, couplers, nuts, and spherical washers assembly as provided by tie rod components manufacturer. All components shall be epoxy coated or hot dip galvanized and provide a complete compatible system.

C. All wales, bearing plates, washer plates, splice plates, shim plates shall meet the requirements of ASTM A-572, Grade 50 and have a minimum thickness as shown on the Contract Drawings.

D. All fabricated connections shall be fabricated with high strength bolts meeting the requirements of ASTM F3125, Grade A325.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to installation of dockwall, the Contractor shall assess and prepare the proposed dockwall driving line and the area extending 100-feet inboard and 50- feet outboard of the dockwall as follows:

1. Perform hydrographic survey of the existing lake bottom. The survey shall include the following:

a. Former discharge slip,

b. Former boat slip,

2. In areas where the dockwall will be installed along the existing shoreline edge, the Contractor shall remove all existing features which will obstruct pile driving or affect pile alignment. These features are likely to consist of, but are not limited to: rip-rap/armor stone, vegetation/ trees and associated root systems, timber debris. These features shall be removed to depth adequate for acceptable pile installation. Stockpile rip-rap/armor stone for reuse on site.

3.02 DEBRIS AND OBSTRUCTIONS

A. Remove debris and obstructions that interfere with installation of the dockwall and anchor wall by pulling or pre-excavating as required. Remove obstructions to a minimum depth of 5 feet below existing mudline and for a minimum distance of 6-feet landward of the dockwall baseline and 2 feet outshore of the dockwall baseline unless directed otherwise by the Owner.

B. Material and debris excavated during obstruction removal shall be fully contained within an upland stockpile and debris shall be hauled for disposal at the Brown County South Landfill in accordance with local regulatory requirements.

3.03 INSTALLATION

A. Coordinate work with that of all other trades affecting or affected by the work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

B. Dockwall and anchor wall shall be installed at the locations shown on the Drawings. Notify Engineer immediately if field conditions prevent installation of any piles at their design locations.

C. Driving equipment and method shall be submitted for review by the Engineer prior to commencement of installation.

D. All piles shall be driven within an approved falsework or approved template to be reviewed by the Engineer during the Submittal phase. In planning driving arrangements, the Contractor shall take into account site conditions.

E. No jetting will be permitted for the dockwall. Extraction and redriving, excavating to remove obstructions, use of an impact hammer, use of a vibratory hammer, and other means may be required for installation of the piles to achieve the required tip elevation.

F. All piles shall be driven to elevations specified in the Contract Documents. Notify Engineer immediately if any piles cannot be installed to their specified tip elevations.

G. All piles shall be driven within 2-percent (1/4-inch over 12-inch height) of plumb and true to line. If piles are driven out of plumb, they shall not be out of plumb in waterside direction (i.e. shall lean landwards). The Contractor may propose, to the Owner's Engineer, different installation criteria based on his means and methods for tie rod/anchor wall installation and backfill operations.

H. No splicing of sheet piles will be permitted.

I. If pipe pile is spliced, only one (1) splice will be permitted and the splice shall be located no higher than Elevation 540. The splice shall be a full-penetration weld.

J. The dockwall shall be installed per the Contractor's Installation Plan as described at 1.11 above. Review of the Contractor's means and methods does not relieve the Contractor of their responsibility to perform all work in accordance with the Contract Documents

K. All bolt holes through the proposed dockwall shall be made using a magnetic drill press.

3.04 FIELD REPORTS

A. The Contractor will keep a record of each king pile or pair of sheet piles installed, and a full report made available to the Engineer after the installation of each 250 feet of dockwall. Such report will include the following at a minimum:

1. King Pile Number

2. Sheet Pile Pair Number.

3. Plan with Pile numbers.
4. Date of driving.
5. Type and size of pile.
6. Tip elevation to nearest 0.1 inch after driving.
7. Pile length before and after cut-off.
8. Hammer type and size.
9. Hammer speed.
10. Vibratory Hammer: Time per foot for each 5 feet of penetration and at obstructions.
11. If Impact hammer used: Blows per foot of driven length and final blows per inch for last three inches. Hammer stroke and ram weight.
12. Description of any unusual circumstances affecting the driving of the pile.
13. The time pile driving is started, interrupted, resumed and stopped.

3.05 DEFORMATION MONITORING POINTS (DMP's)

A. Install DMP's at up to twenty (20) locations, general locations to be selected by the Engineer, to monitor potential movements of the existing dockwalls at Flint Hills Resources terminal, surrounding the boat slip and the overhead power tower foundations. DMP's to consist of two-foot-long steel bars driven into the ground, survey nails driven into the existing pavement, or permanent marks on concrete decks/foundations/caps. Propose DMP details (type and installation procedure) and specific locations for approval by the Engineer. Proposed DMPs shall be capable of identifying vertical and horizontal movements with ¼" accuracy.

B. Survey the coordinates and elevation of each DMP at least twice (on two separate days) before beginning any demolition work or pile driving (to establish a baseline) and daily prior to and post when driving piles within 100 feet of the DMPs and when performing any dredging work within 100 feet of the DMPs. Report data to Engineer daily. Protect all DMPs during the course of the work. Immediately repair or replace DMPs that are damaged.

C. Suspend operations if any of the DMPs moves ½" or more horizontally or vertically and notify the Owner and Engineer immediately. Modify installation procedures to prevent further movements, and resume installation of piles only after consultation with the Owner and Engineer.

D. If any distress is observed in the tower foundations or existing dockwalls, survey the DMPs immediately .

E. Survey all DMPs within three (3) days of completing pile driving

F. Before driving any piles, submit to the Engineer a plan showing the DMP's locations, DMP's number, and the baseline readings. Submit results of the post pile driving survey to the engineer within one (1) week of performing the survey.

G. Perform additional surveys of the DMP's if requested by the Engineer.

H. At completion of the project, remove the DMP's.

3.06 OBSTRUCTIONS

A. Refer to the test boring logs and available plans showing the site conditions. The Contractor is advised that obstructions may be encountered buried within the fill and soil materials.

B. If pile driving is stopped due to an obstruction, notify the Engineer immediately.

C. The Contractor shall attempt to install the pile past the obstruction by raising and redriving the pile and/or by using the hammer for longer on the pile.

D. Where obstructions make it impossible to install certain piles to the required depth at the correct location, attempt to remove or clear the obstruction by excavation. Excavation to a depth of 10 feet below existing ground surface or mudline to remove obstructions shall be at the Contractor's expense. If the Engineer determines that obstructions should be removed by excavation to a depth greater than 10 feet, the Contractor will be reimbursed for the additional work.

3.07 BACKFILL AND MONITORING

A. No backfilling or dredging shall take place within 50 feet of ongoing pile driving operations unless approved otherwise by the Engineer.

B. Prior to any backfilling or dredging within 25 feet of any Dockwall or anchor wall, install up to ten (10) settlement indicators on a prepared subgrade to remain plumb and stable during backfilling or dredging operations. Protect settlement indicators throughout construction.

C. Prior to any backfilling or dredging within 25 feet of any Dockwall or anchor wall, install up to ten (10) bulkhead indicators on the top of the completed bulkhead during backfilling or dredging operations. Protect bulkhead indicators throughout construction.

D. The Contractor shall survey the bulkhead and settlement indicators prior to backfill or dredging operations and shall carefully monitor for movement during all backfilling or dredging operations.

E. All backfill shall be carefully placed to avoid mounding at any point along the wall. Placing of marine stone fill shall be performed starting at the dockwall and moving inland to displace any residual or thin deposits of soft sediments.

F. Compaction of fill shall be performed using suitable equipment which will not damage any component of the partially completed work.

G. Continuously monitor/survey all indicators until movements have arrested and settlements have slowed to less than 1/8” for four (4) consecutive weeks.

1. Dockwall finishes may be constructed once movement of the wall has arrested.

2. Bollard foundations may be constructed only after the settlement criteria above has been met.

END OF SECTION

SECTION 32 11 23

AGGREGATE SURFACE COURSE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Crushed stone paving course, compacted.

1.02 REFERENCES

A. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

B. Wisconsin Department of Transportation (WisDOT) Standard Specifications for Highway and Structure Construction.

1.03 TESTS

A. Gradation of stone materials will be performed in accordance with ASTM C136.

1.04 MEASUREMENT AND PAYMENT

A. Measurement and payment shall be in accordance with specification Section 01 20 00.

1.05 SUBMITTALS

A. Quality Control Submittals and Test Reports:

1. Sieve Analysis Reports for materials shall be submitted in accordance with Sections 01 33 00.

2. All tests will be done at the CONTRACTOR’s expense.

PART 2 PRODUCTS

2.01 MATERIALS

A. Dense Graded Aggregate under Bituminous, 12” CIP.

1. WisDOT 1-1/4-inch CIP to 95 percent. Used as a surface course and as an HMA base course.

B. Granular Backfill Subbase.

1. WisDOT Grade 1 Granular Backfill, CIP to 95 percent. Used as a subbase to Aggregate Surface.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify compacted subgrade is dry and ready to receive work of this Section.

B. Verify gradients and elevations of base are correct.

3.02 PLACING STONE PAVING/AGGREGATE BASE

A. Spread stone material over prepared base to a total compacted thickness as called for on the Drawings.

B. Level surfaces to elevations and gradients indicated.

C. Compact placed stone materials to achieve 95 percent of the maximum unit weight for surface courses.

D. Add water to assist compaction. In the event of an excess water condition, rework topping and aerate to reduce moisture content.

E. Perform hand tamping in areas inaccessible to compaction equipment.

3.03 QUALITY CONTROL

A. Prior to placement of any aggregate, CONTRACTOR shall supply sieve analysis test results for each aggregate material type to be incorporated into the Work. A minimum of two (2) samples shall be analyzed and test results submitted to the ENGINEER for verification of conformance to the Specifications.

B. If at any time during the performance of the Work, CONTRACTOR changes sources for aggregate materials, the CONTRACTOR shall be required to perform two (2) additional sieve analysis test results for each type of aggregate material and shall submit results to the ENGINEER prior to incorporating aggregate into the Work.

C. The ENGINEER shall have the discretion to order additional testing of the aggregate materials if the materials are of inconsistent quality. The costs of all aggregate materials testing shall by borne by the CONTRACTOR.

END OF SECTION

SECTION 32 12 16

BITUMINOUS PAVING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. The work of this section includes, but is not limited to, providing, placing, and compacting bituminous concrete paving.

1.02 RELATED SECTIONS

A. Section 31 20 00 - Earthwork.

1.03 QUALITY ASSURANCE

A. Comply with applicable requirements of Wisconsin Department of Transportation (WisDOT) Standard Specifications for Highway and Structure Construction.

1.04 SUBMITTALS

A. Submit proposed mix design for each material at least 3 weeks before use.

B. Material Certificates: Submit material certificates, signed by material producer and Contractor, stating that materials comply with specifications.

1.05 PROJECT CONDITIONS

A. Weather: Perform work only when existing and forecasted weather conditions are within the limits established by referenced standards. Perform work only when temperature is and is forecasted to be at least 50°F.

B. Substrates: Proceed with work only when substrate construction and penetrating work is complete, and base is dry.

1.06 DEFINITIONS

A. Subgrade is the natural existing material after excavation operations or the top surface of filling operations.

B. Gravel Borrow base course is the layer of Gravel Borrow applied over the prepared subgrade.

C. Bituminous Base Course: Lowest layer of bituminous pavement, placed on natural subgrade or on Gravel or Crushed Stone base course.

D. Binder course is the bituminous pavement layer normally applied below the top course.

E. Top course is the surface or wearing bituminous concrete layer.

F. Note that all of these layers may not be used

PART 2 PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Aggregates: Provide sound, durable, angular material in accordance with Section 32 11 23.

B. Mineral Filler: WisDOT 501.2.6.3 Mineral Filler

C. Binder Grade PG 58-28: WisDOT 501.2.6.2.1

D. Prime Coat: Provide cut-back asphalt complying with AASHTO M82.

E. Tack Coat: Provide emulsified asphalt, CSS-1h, complying with WisDOT Section 455 – Asphaltic Materials and 501.2.6.2.3 – Asphaltic Tack Coat.

2.02 MIXES

A. Provide 4 HT 58-28 H Asphalt Mixture in accordance with WisDOT Section 460 – Hot Mix Asphalt Pavement.

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

A. Reference Standard: Install bituminous concrete paving in accordance with Section 460 of the WisDOT Standard Specifications, except where more restrictive requirements are specified.

B. Subgrade Inspection: Proof-roll subgrade to check for unstable areas. Do not begin work over unsuitable subgrade. Beginning work indicates bituminous concrete installer's acceptance of subgrade.

C. Prime Coat: If shown on Drawing, apply prime coat to prepared subgrade at rate of one-quarter to one-half gallon per square yard. Apply material to penetrate and seal subgrade, but not flood coat. Cure as necessary to permit evaporation of volatiles.

D. Tack Coat: Apply tack coat to previously paved surfaces, surfaces abutting bituminous concrete, and in between new pavement layers at rate of 0.05 gallons per square yard.

E. Placing Mix: Place paving materials with total thickness as shown on Drawings. Place paving materials at minimum temperature of 225°F in strips not less than 10 feet wide where space permits. Complete binder course before beginning top course.

F. Rolling: Begin rolling mixture when materials can bear weight of roller without excessive displacement. Roll at least three times and provide a smooth, compact, uniform surface free of roller marks. After first rolling, repair displaced areas as needed with additional hot material. Roll at least two additional times to thoroughly compact concrete to maximum density and to remove roller marks.

G. Curbs: Use machine laid techniques to ensure straight and true shapes and lines.

3.02 TOLERANCES

A. Thickness: Provide in-place thicknesses within the following tolerances:

1. Gravel, Dense Graded Base Course: ±½ inch.

2. Asphalt Lower and Top Course: +¼ inch or -1/8 inch.

B. Grading and Ponding: Provide uniformly sloped and graded surfaces so that water drains away. No ponding of water is permitted. Finished surfaces shall be true to plane with ±1/8 inch when tested with a 10-foot straightedge.

3.03 PATCHING AND REPAIR

A. Puddles: Repair areas which pond water in strict compliance with Section 460 of WisDOT Standard Specifications.

B. Repair: Repair damaged areas to eliminate all evidence of repair. Cut out, remove, and replace work with fresh, hot asphalt concrete. Compact and roll to maximum density and smoothness.

3.04 CLEANING AND PROTECTION

A. Provide temporary protection to ensure the work as being without dirt, damage, or deterioration at time of final acceptance. Do not permit vehicular traffic until paving has cooled and is ready to receive traffic. Remove protections and clean as necessary immediately before final acceptance.

END OF SECTION

SECTION 32 31 13

CHAIN-LINK FENCES AND GATES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Chain Link Fence Manufacturers Institute Project Manual

1.02 SUMMARY

A. This Section includes the following:

1. Chain-Link Fences: Industrial
2. Gates: Manual Cantilever

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide chain-link fences and gates capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Minimum Post Size and Maximum Spacing for Wind Velocity Pressure: Determine based on mesh size and pattern specified, and on the following minimum design wind pressures and according to CLFMI WLG 2445:
   a. Wind Speed: 80 mph
   b. Fence Height: 8 feet
   c. Line Post Group: IA, ASTM F 1043, Schedule 40 steel pipe/K ASTM F 1043 Steel Pipe
   d. Wind Exposure Category: B
2. Determine minimum post size, group, and section according to ASTM F 1043 for framework up to 12 feet high and post spacing not to exceed 10 feet.

1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

1. Fence and gate posts, rails, and fittings.
2. Chain-link fabric, reinforcements, and attachments.
3. Gates and hardware.

B. Shop Drawings: Show locations of fences, gates, posts, rails, tension wires, details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.

C. Product Certificates: For each type of chain-link fence and gate signed by product manufacturer.

1. Strength test results for framing according to ASTM F 1043.

D. Qualification Data: For Installer

E. Field Quality-Control Test Reports

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Engineering Responsibility: Preparation of data for chain-link fences and gates, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this project.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

B. Interruption of Existing Utility Service: Do not interrupt utility services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner no fewer than three (3) days in advance of proposed interruption of utility services.

2. Do not proceed with interruption of utility services without Owner's written permission.

1.07 MEASUREMENT AND PAYMENT

A. Measurement and payment shall be in accordance with Section 01 20 00.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chain-Link Fences and Gates:

a. Master – Halco

b. Merchants Metal

c. Security Fabricators

d. Century Fence Company

e. Approved Equal

2.02 CHAIN-LINK FENCE FABRIC

A. General: 8 feet. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with ASTM A 392 or A 491, CLFMI CLF 2445, and requirements indicated below:

1. Steel Wire Fabric: The fabric shall be aluminum coated steel chain link conforming to current ASTM Designation A 491, or zinc coated steel chain link

conforming to current ASTM Designation A 392 (Class 1 coating). Chain link fabric shall be No. 9 gauge (.148 inch) wire helically woven in a 2-inch diamond mesh.

2. Weight of Coating: The aluminum coating shall be a minimum of 0.40 ounces per sq. ft. The zinc coating shall be a minimum of 1.2 ounces per sq. ft.

3. Selvage:

   a. Top: Knuckled

   b. Bottom: Knuckled

4. Fabric Connections to Terminal Posts: The chain link fabric shall be securely fastened to all terminal posts using 3/16 x ¾ inch tension bars and 12-gauge tension bands. Provide one band for each foot in height of fence.

2.03 INDUSTRIAL FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IA or Group IC round pipe, and following:

1. Group: IA, round steel pipe, Schedule 40

2. Fence Height: 8 feet

3. Strength Requirement: Heavy industrial according to ASTM F 1043

4. Post Diameter and Thickness: According to ASTM F 1043 and ASTM F 1083

5. Post Size and Thickness: According to ASTM F 1043

   a. Top Rail: 1.66 O.D. inches

   b. Line Post: 2.50 O.D. inches

   c. End, Corner and Pull Post: 3.00 O.D. inches

      1) Pull posts shall be installed at 300-foot intervals with bracing same as for terminal posts.

   d. Swing Gate Post: According to ASTM F 900 and table below:

      1) Gate Post Dimensions:

Gate Leaf Width	Outside Diameter of Pipe (in)	Minimum Weight (lb./ft.)
For Gate Fabric Height of 6 ft. or less		
0-4 ft.	2.375	3.110
Over 4 ft. to 10 ft.	2.875	4.640
Over 10 ft. to 18 ft.	4.000	6.560
For Gate Fabric Height Over 6 ft.		
0-6 ft.	2.875	4.640
Over 6 ft. to 12 ft.	4.000	6.560
Over 12 ft. to 18 ft.	6.625	18.970
Over 18 ft. to 24 ft.	8.625	27.120

2) The Contractor shall be responsible for determining gate post size prior to submitting a Bid.

B. The steel posts shall be either zinc-coated or aluminum-coated, inside and outside in accordance with one of the following methods:

1. Zinc Coating: On pipe sections the weight of zinc coating shall be a minimum average of 1.8 ounces per square foot of surface and a minimum of 1.6 ounces per square foot of surface on a single specimen. Testing shall be in accordance with ASTM A90.

2. Aluminum Coating: The weight of the aluminum coating on posts shall be a minimum average of 0.75 ounces per square foot of surface and a minimum of 0.70 ounces per square foot of surface on a single specimen, when testing in accordance with ASTM A428. The aluminum used for coating shall be the type known in the industry as Type 2 (commercially pure).

C. Optional framework shall be galvanized inside and outside with a minimum of 1.0 ± 0.15 ounce of zinc coating per square foot of surface in accordance with ASTM A-525. After roll forming, the exterior of the alternate framework shall receive a chromate conversion coating and 0.3-0.7 mils of clear acrylic coating.

D. Sizes of the optional high strength pipe shall be the same as specified for Schedule 40 pipe.

2.04 TENSION WIRE

A. General: Provide horizontal tension wire at the following locations:

1. Extended along top of fence fabric for entire fence length.

B. Galvanized-Coated Steel Wire: Seven (7) gauge, 0.177-inch diameter, galvanized tension wire complying with ASTM A 824, and the following:

1. Metallic Coating: Type II, Class 2, zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:

a. 1.20 oz./sq. ft.

2.05 INDUSTRIAL SWING GATES

A. General: Comply with ASTM F 900 for double swing gate types

1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1043 and ASTM F 1083 for materials and protective coatings.

B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 900 and the following:

1. Gate Fabric Height: 6 feet

2. Leaf Width: 15 feet

3. Frame Members:

a. Tubular Steel: 1.90 (min) inches round.

b. Designed for the width and built so that the outer members shall not sag in excess of 1% of the gate leaf width or 2 inches.

c. Additional horizontal, vertical, or diagonal member or diagonal truss rods may be needed to comply with the above requirement.

4. Gate leaves shall have vertical interior bracing at maximum intervals of 8 feet.

C. Gate Fabric:

1. Same type as used in fence construction. The fabric shall be attached securely to the gate frame at intervals not exceeding 15 inches.

D. Zinc-Coated steel frames shall be in accordance with ASTM Specifications F 1043 and F 1083, or a combination thereof, and shall match that selected for any adjoining fence framework. Welded joints shall be coated in accordance with Practice A780, employing a zinc-rich paint.

E. Frame Corner Construction:

1. Welded for all panels.

F. Double Gate Latch:

1. Gate Latch shall be a “frost free latch” arranged to engage the gate stop.

a. “Pioneer” brand or equal

2. Locking devices shall be constructed so that the “frost free latch” cannot be raised when the gate is locked.

3. The latching devices shall have provision for a padlock.

4. Latches shall permit operation from both sides of the gate.

5. Any chains and/or padlocks shall be furnished and installed by the Owner.

G. Gate Stops shall be provided for all double gates.

H. Keepers shall be provided for each gate leaf over 5 feet.

I. Gate Hinges:

1. Hinges shall be structurally capable of supporting the gate leaf and allow the gate to open and close without binding.

2. Designed to permit the gate to swing a full 180°.

3. “Bulldog” style hinges shall be used.

J. Gate Latches:

1. Shall permit operation from both sides of gate.

K. Gate Accessories:

1. All gate accessories shall be of the materials specified for the fence.

2.06 CANTILEVER GATES

A. Comply with requirements of ASTM F 1184 Type II.

1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1043 and ASTM F 1083 for materials and protective coatings.

B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 900 and the following:

1. Gate Fabric Height: 6 feet

2. Leaf Width: per Drawings

3. Frame Members:

a. Tubular Steel: Top and bottom steel pipe “track” members to be 2.5” O.D. Vertical and internal members minimum 1.90” O.D.

b. Designed for the width and built so that the outer members shall not sag in excess of 1% of the gate leaf width or 2 inches.

c. Additional horizontal, vertical, or diagonal member or diagonal truss rods may be needed to comply with the above requirement.

d. The length of the back frame support section shall be a minimum of 40% of the opening.

4. Gate frame to be fabricated by welding. Horizontal and vertical members shall be located no greater than 8 feet apart.

5. Gate Posts: 4.00-in. O.D. posts set in 12”x48” footings.

C. Gate Fabric:

1. Same type as used in fence construction. The fabric shall be attached securely to the gate frame at intervals not exceeding 15 inches.

D. Zinc-Coated steel frames shall be in accordance with ASTM Specifications F 1043 and F 1083, or a combination thereof, and shall match that selected for any adjoining fence framework. Welded joints shall be coated in accordance with Practice A780, employing a zinc-rich paint.

E. Frame Corner Construction:

1. Welded for all panels.

F. Gate Latch:

1. Gate Latch shall be a “frost free latch” arranged to engage the gate stop.

a. “Pioneer” brand or equal

2. Locking devices shall be constructed so that the “frost free latch” cannot be raised when the gate is locked.

3. The latching devices shall have provision for a padlock.

4. Latches shall permit operation from both sides of the gate.

5. Any chains and/or padlocks shall be furnished and installed by the Owner.

G. Rollers:

1. External nylon rollers with covers.

2. Gates designed to open or close by applying an initial pull force no greater 40 lbs. (18.14 kg).

2.07 FITTINGS

A. General: Comply with ASTM F 626

B. Post and Line Caps: Provide for each post

1. Line post caps with loop to receive top rail.

C. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.

2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.

E. Tension and Brace Bands: Pressed steel

F. Tension Bars: Steel, not less than 3/16 inch by ¾ inch, and length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:

a. Hot-Dip Galvanized Steel: 11-gauge wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.

I. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. zinc.

2.08 CAST-IN-PLACE CONCRETE

A. Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33, and potable water for ready-mixed concrete complying with ASTM C 94. Measure batch and mix project-site-mixed concrete according to ASTM C 94.

1. Concrete Mixes: Normal-weight concrete air entrained with not less than 3,000-psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

B. Materials: Dry-packaged concrete mix complying with ASTM C 387 for normal-weight concrete mixed with potable water according to manufacturer's written instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, and other conditions affecting performance.

1. Do not begin installation before final grading is completed, unless otherwise permitted by Engineer/Owner.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.03 INSTALLATION, GENERAL

A. Installation of chain-link fencing and gates shall meet the requirements of ASTM F 567 which are not intended to preclude any practice that has a proven performance equal to or better under varying conditions nor do they purport to address all of the safety problems involved.

1. Install fencing on established boundary lines inside property line.

3.04 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil. Install posts to a depth of 48 inches below ground surface.

B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete.

2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect above-ground portion of posts from concrete splatter.

a. Concealed Concrete: Top 6 inches below grade to allow covering with surface material.

C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more.

D. Line Posts: Space line posts equidistant at intervals not exceeding 10 feet o.c.

E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at mid-height of fabric 6 feet or higher, on fences with top rail. Install so posts are plumb when diagonal rod is under proper tension.

F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 11-gauge hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric.

1. Top Tension Wire: Install tension wire through post cap loops.

G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

H. Bottom Rails: Install, spanning between posts.

I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.

J. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at 1 end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 15 inches o.c. and to braces at 24 inches o.c.

K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

3.05 GATE INSTALLATION

A. Install gates according to manufacturer’s written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using

tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.06 ADJUSTING

A. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware, gate operator, and other moving parts.

END OF SECTION

SECTION 32 90 00

FINAL LANDSCAPING

PART 1 GENERAL

1.01 WORK INCLUDES

A. Grading and seedbed preparation of topsoil on disturbed area, stockpiles, ditches, and any area designated by the OWNER during construction.

B. Seeding, mulching, and fertilizing topsoiled or disturbed areas.

1.02 REFERENCES

A. Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction.

1.03 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Seed shall have a germination rate of not less than 85%.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging will not be accepted.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and the name of the manufacturer.

1.05 SUBMITTALS

A. Provide seed, fertilizer, and mulch product data a minimum five days prior to placement for each seed mixture.

B. Submit results of topsoil tests and nutrient analysis from local agricultural extension office prior to placement.

PART 2 PRODUCTS

2.01 SEED MIXTURE

A. Temporary Seeding, Turf seeding, and General Permanent Seeding shall use the WisDOT approved seed types and rates as described in Section 630 of the Standard Specifications for Highway and Structure Construction, or as approved by OWNER.

2.02 TOPSOIL

A. Topsoil shall be prepared to a suitable seedbed with even grades and lines. Moderately rough conditions and tracking may remain in woodland areas.

B. Topsoil preparation in lawn areas shall be performed to provide a smooth, firm seedbed that is suitable for mowing and maintenance with small tractors operated by ATK. Topsoil surface should be free of debris and tree roots, and stones larger than 1-1/2 inches.

2.03 MULCHING MATERIAL

A. Seeded areas shall be mulched in accordance with Section 627 of the WisDOT standard specifications. In general, areas with slopes over 10% shall be covered with rolled erosion control mats. Straw should be used in areas where lawn will be established. Recovered chips may be used on the woodland sites and the capping area.

B. Mulch products brought to the site shall be to the quality requirements of the WisDOT standard specifications and approval of the site owner.

2.04 FERTILIZER

A. In accordance with Section 629 of the WisDOT standard specification for Fertilizer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Seasonal limitations shall be as specified in WisDOT standard specification, unless otherwise directed by the OWNER.

3.02 SURFACE PREPARATION

A. All temporary haul roads shall be de-compacted/scarified prior to seeding by disking to a minimum depth of 1 foot.

B. All stockpiles shall be groomed to remove irregularities, clods, and rocks larger than 4 inches. The maximum slopes on soil stockpiles shall be 3:1.

3.03 FERTILIZING

A. Mix thoroughly into upper 2 inches of topsoil.

3.04 SEEDING

A. Do not seed areas in excess of that which can be mulched on same day.

3.05 HYDROSEEDING

A. Hydroseeding may be considered provided CONTRACTOR submits detailed specifications for hydroseeding, including methods, equipment and application rates.

3.06 MULCHING

A. Place mulch in accordance with WisDOT standard specifications.

3.07 GRADE TOLERANCE

A. The surface elevation of the final capping area soils may deviate up to 1 foot above approved plans if each component meets the minimum thickness requirement and positive site drainage of runoff is maintained.

B. Lawn areas shall be within 0.2 feet of design grades or as directed by OWNER.

3.08 MAINTENANCE AND RELEASE

A. CONTRACTOR shall maintain seeded areas until mulched and approved by OWNER. Removal of weeds or invasive species within the first 6 months shall be the responsibility of the CONTRACTOR.

B. CONTRACTOR shall be released from reseeding, fertilizing or grading of the restored areas upon demonstration of a dense growth of permanent vegetation that is a minimum of six months old. Dense growth defined as a minimum ground cover of 50% of the exposed soil based on a qualitative assessment of five sample plots measuring 3-feet by 3-feet on the seeded areas.

END OF SECTION

SECTION 33 05 13

MANHOLE CASTINGS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Cast iron manhole frame and cover.

1.02 RELATED WORK

A. Section 03 30 00: CAST-IN-PLACE CONCRETE.

1.03 REFERENCES

A. ASTM A48 - Cast Iron Metal.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cast iron manhole frames and covers shall conform to ASTM A48, Class 35B - Gray iron.

B. All castings shall be manufactured true to pattern. Component parts shall fit together in a satisfactory manner.

C. Manhole frame and cover shall include provisions for security bolting of cover.

D. Two (2) wrenches for security bolts shall be provided.

PART 3 EXECUTION

3.01 PREPARATION

A. Supply anchor bolts to be cast or grouted into cast-in-place concrete.

B. Place a bed of neat mortar on the surface of concrete on which manhole frame will rest. Mortar shall be placed immediately prior to setting frame.

3.02 EXECUTION

A. Install manhole frame on mortar bed aligned as shown on the drawings.

B. Level the frame and shim as necessary to maintain level until mortar bedding has set.

C. Install nuts on anchor bolts and tighten securely.

END OF SECTION

SECTION 33 30 00

SANITARY SEWER, MANHOLES, AND FORCEMAIN

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).

B. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2021.

C. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2020.

D. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.

E. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing; 2016.

F. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials; 2021.

G. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter; 2024.

H. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. through 65 In. (100 mm through 1650 mm), for Waterworks; 2021.

1.02 WORK INCLUDED

A. Valves, fittings, and accessories.

B. Sanitary sewers, laterals, and connections to existing sanitary sewers.

C. Manhole structures and connections to existing sanitary sewer manholes.

D. Force main piping, anchors, underground marking tape, and connections to existing sanitary sewer force main.

1.03 REFERENCES

A. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-flow Applications.

B. ASTM C478 - Precast Reinforced Concrete Manhole Sections.

C. ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

D. ASTM D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for PE Plastic Pipe and Tubing.

E. ASTM F714 – Standard Specification for 3” – 63” Polyethylene Pipe.

F. ASTM D5926-04 – Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems.

G. ASTM C1173-02 – Standard Specification for Flexible Transition Couplings for Underground Piping Systems.

1.04 SUBMITTALS

A. Submit product data on pipes, valves, fittings, pipe accessories, manholes, and appurtenances.

B. Submit in accordance with Section 01 33 00.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 MEASUREMENT AND PAYMENT

A. Measurement and payment shall be in accordance with Section 01 20 00.

PART 2 PRODUCTS

2.01 PIPE MATERIALS

A. Sanitary Sewer Main: PVC sanitary sewer main pipe shall be SDR 26 per ASTM 3034 for the sizes indicated on the Drawings.

B. Sanitary Sewer Laterals: PVC sanitary sewer lateral pipe and fittings shall be SDR-26 per ASTM D3034 for the sizes indicated on the Drawings.

C. Buried ductile iron pipe and fittings shall be mechanical or push joint type AWWA Class 52 with cement lining per ASTM C104.

D. Exposed ductile iron pipe and fittings shall be flanged, Class 53, with cement lining per ASTM C104.

E. High Density Polyethylene (HDPE) Force main Piping: HDPE pipe for sanitary sewer force main shall meet all requirements of AWWA C906 or the latest revision thereof. Pipe shall be designed for a minimum working pressure of 160 pounds per square inch (psi), have a standard dimension ratio (SDR) of 11 or less, and have cast-iron-pipe-equivalent outside diameters for the sizes as indicated on the Drawings. Pipe material shall be manufactured from a PE3408 resin listed with the Plastic Pipe Institute (PPI) as TR-4 and shall meet ASTM F412. The resin material shall meet the specifications of ASTM D3350-02 or the latest revision thereof with a minimum cell classification of

PE345464C. The pipe shall be homogenous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

F. 9 and have an AWWA C906 working pressure rating of 5 feet at flow velocity of 200 psi per second.

2.02 JOINTS FOR PVC PIPE

A. Joints for PVC sanitary sewer main, laterals, and fittings shall be by push-on joints.

2.03 JOINTS FOR HDPE PIPE

A. Butt Fusion: HDPE sanitary sewer force main pipe shall be by the butt fusion process using heated plates and a fusion machine specifically designed for the pipe size required and the butt fusion process and shall be in accordance with ASTM D3261.

B. Where HDPE pipe transitions to in-line non-HDPE piping, the connection shall be made using a mechanical connection with restraint. This can be accomplished using a fused flange adaptor and backup ring, MJ Adaptor, or other method approved by the Engineer prior to construction.

1. Flanged and Mechanical Joint Adaptors: PE 3408 HDPE, Cell Classification 345464C as determined by ASTM D3350-02 and be the same base resin as the pipe. Flanged and mechanical joint adaptors shall have a manufacturing standard of ASTM D3216. All adaptors shall be pressure rated to provide a working pressure rating no less than that of the pipe.

2. Mechanical Restraint: Mechanical restraint for HDPE may be provided by mechanical means separate from the mechanical joint gasket sealing gland. The restrainer shall provide wide, supportive contact around the full circumference of the pipe and be equal to the listed widths. Means of restraint shall be machined serrations on the inside surface of the restrainer equal to or greater than the listed serrations per inch and width. Loading of the restrainer shall be by a ductile iron follower that provides even circumferential loading over the entire restrainer. Design shall be such that restraint shall be increased with increases in line pressure.

a. Serrated restrainer shall be ductile iron ASTM A536-80 with a ductile iron follower; bolts and nuts shall be stainless steel.

b. The restrainer shall have a pressure rating of, or equal to that of the pipe on which it is used or 150 PSI whichever is lesser. Restrainers shall be JCM Industries, Sur-Grip or pre-approved equal.

Nominal Size	**Restraint Width**	**Serrations per inch**
4”, 6”	1 ½”	8
8”, 10”, and 12”	1 ¾”	8

c. Pipe stiffeners shall be used in conjunction with restrainers. The pipe stiffeners shall be designed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 304 or 316 stainless steel to the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE. Stiffeners shall be by JCM Industries or pre-approved equal.

2.04 JOINTS FOR DUCTILE IRON PIPE

2.05 PIPE ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required wyes, bends, elbows, reducers, traps, and other configurations required. See Drawings for cleanouts.

B. Valves and miscellaneous accessories: Manufacturer and model shall be as indicated on the Drawings or an approved equal with end design to connect to piping as shown.

2.06 DETECTABLE WARNING TAPE

A. Detectable warning tape shall be 5 mils thick and feature a print style which cannot be scraped off or erased.

B. Detectable warning tape shall be six (6) inches in width and shall read: "CAUTION – SANITARY FORCEMAIN BURIED BELOW" and green in color.

C. Detectable warning tape shall be woven reinforced for non-stretch, non-distorting, high strength for plowing requirements.

D. Manufacturers:

1. Reef Industries, Terra Tape, Sentry Line Reinforced Detectable.

2. Approved Equal.

2.07 MANHOLES

A. Base, riser section and flat top shall be constructed in accordance with ASTM C478.

B. Joints shall meet ASTM C443.

C. Connections between manhole structure and pipes shall meet ASTM C923.

D. Manhole Steps:

1. Provide plastic coated steel or cast-iron steps with 16" spacing. EJIW 8512, M.A. Industries PS-1-PF or Neenah R-1881-J or equal.

2. Top step to be a minimum of 18" below top of casting in order to enable clear access through cover.

E. Frame and Lid:

1. Castings shall be in accordance with Section 33 05 13.

F. Adjusting Rings:

1. Rings shall be made of composite rubber and shall be installed with a polyurethane sealant per manufacturer's recommendations.

2. EJIW Infra-Riser or approved equal.

G. Concrete manhole where force main discharges into the gravity sewer shall be as indicated on the Drawings.

H. All sewer taps shall be constructed for all sizes of pipes as indicated on the Drawings. All sewer taps shall be made in accordance with the latest revision of the MDOT Standard Specifications for Construction.

2.08 FLEXIBLE TRANSITION COUPLINGS

A. When a new sanitary sewer is connected to an existing sanitary sewer main or lateral and a manhole is not utilized at or near the point of connection, the Contractor shall be required to make a water-tight connection by use of a manufactured flexible transition coupling designed for such purpose.

B. Flexible transition couplings shall be in accordance with ASTM D5926-02 and ASTM C1173-02 or the latest revisions thereof.

C. Manufacturers:

1. Fernco, Inc.

2. Approved Equal

2.09 INSULATION

A. Closed cell, DOW Chemical Company Styrofoam HI-40 brand or equal. Sheet size: 4'x8'.

2.10 COATINGS

A. Exposed piping and fittings shall be coated in accordance with the pipe manufacturer's specifications and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavation base is ready to receive work, and excavations, dimensions, and elevations are as indicated on Drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with material as specified.

B. Remove large stones or other hard matter which could damage drainage pipe or impede consistent backfilling or compaction.

3.03 DEWATERING SYSTEM AND BYPASS PUMPING

A. The Contractor shall determine prior to bid the extent of dewatering required. Contractor should familiarize himself/herself with existing soil conditions and evaluate the extent of dewatering required to lower the ground water table in the area of excavation by pumping in order to provide dry laying conditions for the pipe, and also to prevent cave-ins and unnecessarily large excavations.

B. The Contractor shall have available adequate equipment to perform the work of dewatering necessary for the timely and safe progress of the work.

C. The Contractor shall have available bypass pumping equipment, labor, and materials to perform the work of bypass pumping for the interrupted flow of sewage in the sewer mains during construction of new sewers and coordinate the progress with the Engineer and Owner.

D. Equipment used for dewatering and bypass pumping shall be of a size and type adequate to perform the job and shall be operated in such a manner as to create as little nuisance to the public as possible. In particular on operations which require continuous pumping over prolonged periods of time, contractor should do everything possible to reduce noise from pumps, generators, and other equipment.

E. The Contractor shall monitor his/her dewatering operation at all times to ensure that the method used does not undermine pipe bedding, place nearby utility in jeopardy, allow groundwater to enter sanitary sewer pipe, or cause subsidence or damage to adjacent properties.

F. Contractor shall, on his own accord, conduct field investigations as deemed necessary to satisfy himself/herself so as to the extent of dewatering and bypass pumping required to satisfactorily conduct the work as per Drawings, Specifications and as directed by the Engineer.

3.04 PVC SANITARY SEWER MAIN

A. Install pipe, fittings, and accessories in accordance with the Contract Documents and the manufacturer’s specifications and instruction.

B. Lay pipe to slope gradient noted on Drawings.

C. Covering and backfilling over the pipe shall be done in accordance with the Contract documents.

D. Compaction of each successive lift shall refer to the Specifications for compaction requirements. Do not displace or damage pipe when compacting.

E. Connect to existing sanitary sewers and manholes, including all fittings, as shown on the Drawings and as specified herein.

F. In soil conditions where 6-foot depth of bury cannot be achieved or for reasons of utilities crossings, provide and install insulation. Insulation shall be laid only after obtaining written approval of the Engineer.

G. Contractors shall utilize a pipe laser and target system for the installation of all sanitary sewer main. The pipe laser shall be set up inside the pipe at all times unless otherwise approved by the Engineer. Pipe shall be laid at the grade indicated on the Drawings. Invert elevations at each manhole shall be field verified and where deviations from plan elevations are encountered, Engineer shall be notified immediately.

3.05 HDPE SANITARY SEWER FORCEMAIN

A. Joining Pipe:

1. Butt Fusion: A hot plate butt fusion method shall be used for joining the HDPE pipe. The fusion method shall be performed using apparatus specified by the pipe manufacturer and approved by the Engineer. Sections of HDPE pipe shall be joined into continuous lengths on site above ground.

2. Mechanical: Bolted joining may be used where the butt fusion method cannot be used. Flange joining shall be accomplished by using a HDPE flange adaptor with a ductile iron back-up ring. Mechanical joint joining shall be accomplished using either a molded mechanical joint adaptor or the combination of a Sur-Grip Restrainer and Pipe Stiffener as manufactured by JCM Industries or approved equal. Either mechanical joint joining method shall have a ductile iron mechanical joint gland.

3. The Contractor shall submit project references and an experience record for all projects in which HDPE pipe was installed. If, in the opinion of the Engineer, the Contractor is inexperienced in joining HDPE pipe, a representative of the pipe manufacturer must be on site during the fusion joining process.

B. Installing Pipe:

1. Sanitary sewer forcemain shall be installed with a minimum of seven (7) feet of cover unless otherwise directed by the Engineer/Owner.

2. Forcemain piping shall be installed level or with a continuous upward slope towards the discharge point.

C. Pressure Testing:

1. After the entire length of HDPE has been joined and laid, it shall be capped and filled with water, taking care to bleed off any trapped air. It shall then be subjected to a hydrostatic pressure of 100 psi at the highest elevation of the test section. The test section shall be pressure tested prior to backfilling unless otherwise directed by the Engineer.

2. The test procedure consists of two (2) steps: The initial expansion and the test phases. To compensate for initial expansion of the pipe under the test, sufficient make-up water shall be added to the system at hourly intervals for three (3) hours to return to the test pressure. After completion of the first phase, the actual test shall begin.

3. The test phase shall not exceed three (3) hours. After this testing period, a measured amount of make-up water shall be added to return to the test pressure. The amount of make-up water shall not exceed the allowance given in the following Table. Alternatively, testing for leakage can be done by maintaining the test pressure over a period of four (4) hours, and then dropping the pressure by

10 psi. If the pressure remains steady (within 5% of the target value) for an hour, no leakage in the system is indicated.

Nominal Pipe Size (inches)	Make-Up Water Allowance (U.S. Gallons per 100 Feet of Pipe)		
	1 Hour Test	2 Hour Test	3 Hour Test
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.3	2.1
12	1.1	2.3	3.4
14	1.4	2.8	4.2
16	1.7	3.3	5.0
18	2.2	4.3	6.5
20	2.8	5.5	8.0
22	3.5	7.0	10.5
24	4.5	8.9	13.3
26	5.0	10.0	15.0
28	5.5	11.1	16.8
30	6.3	12.7	19.2
32	7.0	14.3	21.5
34	8.0	16.2	24.3
36	9.0	18.0	27.0

3.06 MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Install sand fill in 12" layers and compact to 95% density per the specifications.

C. Precast reinforced concrete units shall be constructed and installed in accordance with ASTM C478 and the details shown on the Drawings.

D. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

E. Cast lid and frame level in flat top covers and set to height or elevation indicated on the Drawings.

F. Use adjusting rings as required, but no more than 4 (3 if using infra-riser), to obtain proper rim elevations.

G. Mortar joints of adjusting rings, plaster outside and strike inside clean.

3.07 PVC SANITARY SEWER LATERALS

A. Compatible for direct connection to wye by push-on joint.

B. Lateral shall be constructed from sanitary sewer main to a building sewer at or near the right-of-way line or other point of termination as directed by Engineer.

C. Minimum grade: 1/8" per foot.

3.08 DETECTABLE WARNING TAPE

A. Detectable warning tape shall be installed centered directly above the force main pipe at a depth of 4.0’ below the finished grade surface.

3.09 INSPECTION AND ACCEPTANCE TESTING FOR PVC SANITARY SEWER MAIN

A. The Contractor shall perform deflection, air testing, post construction televising and report, and infiltration or exfiltration (if required by Engineer/Owner) for each manhole to manhole run of PVC sewer installed on the project in the presence of the Engineer. If the Contractor performs any of the inspection and acceptance in the absence of the Engineer, the Contractor shall be required to repeat the testing in the presence of the Engineer at no extra cost to the Owner.

B. The Contractor shall supply the qualified personnel and all equipment and materials necessary to perform the testing as described. Inspection and Acceptance Testing shall be considered incidental and shall be included in the Contract Unit Price for sanitary sewer pipe unless specifically listed in the Bid Schedule.

C. The Contractor shall complete inspection and acceptance testing prior to final street and surface restoration but after backfilling and ground water has returned to its normal level (when dewatering systems are used).

D. All sewers where the ground water level is above the top of the sewer by more than 7 feet, shall be subjected to infiltration tests. All sewers, where the ground water level above the top of the sewer is 7 feet or less, shall be subjected to air tests or exfiltration tests. If an exfiltration test is performed, the maximum exfiltration rate shall be the same as that permitted from infiltration. For the purposes of exfiltration testing, the internal water level shall be equal to the external water level plus 7 feet as measured from the top of the sewer pipe.

E. Within five (5) working days following pipe-laying and backfilling of each manhole-to-manhole section, the Contractor shall complete all testing. Should the workmanship employed, or pipe material selected fail to meet the test requirements, the Contractor shall select a different material or utilize different techniques to achieve the desired results.

F. Where groundwater conditions require dewatering operations in order to construct sewers, the Contractor, may, at his option, perform preliminary air tests after backfilling and while the dewatering equipment is still operating. After dewatering operations have ceased and groundwater has stabilized at its normal level, 7 feet or less above the sewer and if the preliminary air test was satisfactory, the preliminary air test may be accepted as final.

G. Any defects found during the inspection and acceptance testing shall be promptly repaired by the Contractor as no additional cost to the Owner.

H. Deflection testing of PVC sewer pipe:

1. In addition to other acceptance tests, PVC sewer pipe shall be tested for vertical deflection.

2. Deflection tests shall be performed on 100% of the total footage of PVC sewer pipe of eight (8) inches in diameter and larger installed on the project.

3. This testing shall be carried out under the observation of the Engineer using a GO-NO-GO device approved by the Engineer and furnished by the Contractor.

4. The deflection testing shall be performed between thirty (30) days after final backfill of the trench and thirty (30) days prior to final acceptance of the project.

5. The maximum allowable vertical deflection of the circular cross section of the pipe will be limited to five percent (5%) of the actual internal pipe diameter. If the results of the testing show the deflection of any sewer to be in excess of the maximum allowable, then the Contractor shall make repairs by re-excavation and compaction or replacement at no additional expense to the Owner.

I. Air testing of PVC sewer pipe:

1. Air testing shall be performed on 100% of PVC sewer piping installed on the project.

2. The sewer lines shall be tested in increments between manholes. The lines shall be cleaned and plugged at each manhole. All plugs shall be designed to withstand internal testing pressures without external support and shall provide and air-tight seal. One of the plugs shall have an orifice through which air can be introduced into the sewer. An air supply line shall be fitted with suitable control valves and a pressure gauge for continually measuring the air pressure in the sewer.

3. Air control equipment shall include the following as a minimum:

a. Shutoff valve

b. Pressure regulating valve

c. Pressure relief valve

d. Input pressure gauge

e. Continuous monitoring pressure gauge

f. This gauge shall not be less than 3 ½ inches in diameter and have a pressure range from zero (0) to at least 10 PSI with minimum divisions of 0.10 PSI and an accuracy of plus or minus 0.4 PSI.

4. Two (2) separate hoses shall be used for this test. One connects the control panel to the sealed line for introducing the air, and the second is used to constantly monitor the air pressure buildup. This is done to greatly reduce the chance of over-pressurizing the line.

5. Line Pressurization:

a. Low-pressure air shall be slowly introduced into the pipe until the internal air pressure reaches 4.0 PSIG greater than the greatest back pressure caused by groundwater over the top of the sewer pipe.

6. Pressure Stabilization:

a. After the above test pressure is reached, the air supply shall be throttled to maintain the internal pressure for at least two (2) minutes. If necessary, air shall be added to the sewer to maintain a pressure of 3.5 PSIG or greater.

b. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall.

7. Test Pressure:

a. When temperatures have been equalized and the pressure stabilized, the air supply hose shall be closed so that no more air will enter the sewer.

b. The sewer air pressure shall be noted and timing for the test begun.

c. The test shall not begin if the air pressure is less than 3.5 PSIG, or such other pressure as is necessary to compensate for ground water level.

8. Air Test Timing:

a. A predetermined time for the duration of the test shall be used to determine the line's acceptability.

b. The allowable time shall be calculated from the following equation:

1) T = 0.085*D*K/Q, where

2) T = Shortest time in seconds, for pressure to drop 1 PSIG

3) K = 0.000419 D*L, but not less than 1.0

4) Q = Coefficient = 0.0015 cf/min/sf or internal surface area

5) D = nominal pipe diameter, in inches

6) L = Length of pipe being tested, in feet

c. The following table represents the allowable time required for the air pressure to decrease 1.0 PSIG for the given diameters and lengths of pipe:

ALLOWABLE TIME, T (MINUTES:SECONDS) FOR SEWER TEST LENGTH, L (FEET)				
PIPE DIAMETER (INCHES)	**L=100**	**L=200**	**L=300**	**L=400**
8	**7:34**	**7:34**	**7:36**	**10:08**
10	**9:26**	**9:26**	**11:52**	**15:49**
12	**11:20**	**11:24**	**17:05**	**22:47**
15	**14:10**	**17:48**	**26:42**	**35:36**
18	**17:00**	**25:38**	**38:27**	**51:16**
21	**19:50**	**34:54**	**52:21**	**69:48**
24	**22:47**	**45:34**	**68:22**	**91:10**

J. Post Construction Televising and Report:

1. After completion of installation of gravity sanitary sewer mains and manholes, Contractor to provide post construction televising inspection on 100% of new sewer mains in-place. The inspection report should include a printout, digital color video recording, which should include date of televising, running footage (in tenths) explaining the location and manhole identification. The report should also include location and orientation of service lateral connections.

2. Engineer/Owner shall review the report jointly with the Contractor. While reviewing the tape and report, if the Engineer/Owner determines that at a certain location spot, the quality of work is not as per Drawings and Specifications and is not acceptable, Contractor shall immediately repair and restore the location to the satisfaction of the Engineer/Owner, at no extra cost to the Owner.

3. Upon completion of the post construction televising, the Contractor shall furnish to Owner one (1) complete set of the report printout and digital video recording for all sanitary sewer main televised.

4. All sewer cleanout residue shall be removed and disposed in accordance with all rules, laws, and regulations.

K. Infiltration Testing:

1. Maximum allowable infiltration testing shall not exceed 100 gallons per inch of diameter per mile of pipe per 24 hours for any individual run between manholes.

2. The following table is a schedule of sanitary sewer infiltration (exfiltration) for the specified pipe diameters:

ALLOWABLE LIMITS BASED ON 100 GALLONS PER INCH OF DIAMETER OF PIPE, PER MILE OF PIPE, PER 24 HOURS	
PIPE DIAMETER (INCHES)	**ALLOWABLE LIMIT (GALLONS/FOOT/HOUR)**
8	**0.00630**
10	**0.00790**
12	**0.00950**
15	**0.01185**
18	**0.01420**
21	**0.01660**
24	**0.01890**

L. If a sewer fails to pass any of the previously described tests, the Contractor shall determine the location of the leaks, excavate, repair them, and retest the sewer. The tests shall be repeated until satisfactory results are obtained.

M. Pressure testing forcemain piping:

1. After the pipeline has been laid, it shall be filled with water, taking care to bleed any trapped air. It shall then be subjected to a hydrostatic pressure test, with a test pressure of 145 psi at the highest elevation of the test section. When, in the opinion of the Engineer, local conditions require that the trenches be backfilled immediately after the pipe has been laid, the pressure test may be made after backfilling has been completed.

2. The test procedure consists of two (2) steps: The initial expansion and the test phases. To compensate for initial expansion of the pipe under test, sufficient make-up water shall be added to the system at hourly intervals for three (3) hours to return to the test pressure. After the completion of the first phase (4 hours after initially pressurizing the pipe under test), the actual test shall begin.

3. The test phase shall not exceed three (3) hours. After this testing period, a measured amount of make-up water shall be added to return to the test pressure. The amount of make-up water shall not exceed the allowance in the following table. Alternatively, testing for leakage can be done by maintaining the test

pressure over a period of four (4) hours, and then dropping the pressure by 10 psi. If the pressure remains steady (within 5% of the target value) for one (1) hour, no leakage in the system is indicated.

ALLOWANCE FOR EXPANSION UNDER TEST PRESSURE

Allowance for Expansion (U.S. Gallons/100 feet of pipe)

Nominal Pipe Size (in.)	1 Hour Test	2 Hour Test	3 Hour Test
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.3	2.1
12	1.1	2.3	3.4
14	1.4	2.8	4.2
16	1.7	3.3	5.0
18	2.2	4.3	6.5
20	2.8	5.5	8.0
22	3.5	7.0	10.5
24	4.5	8.9	13.3
26	5.0	10.0	15
28	5.5	11.1	16.8
30	6.3	12.7	19.2
32	7.0	14.3	21.5
34	8.0	16.2	24.3
36	9.0	18.0	27.0

N. Method of testing and measurement shall be approved by the Engineer.

O. Where structural failures of the pipe have occurred, the broken pipe sections shall be excavated, removed, and reconstructed. The Contractor shall not be permitted to use “Fernco” connectors for repair of mainline pipe sections. The Contractor shall remove the defective section of sewer pipe and relay all sections of sewer pipe from the defective section to the nearest manhole structure otherwise approved by the Engineer/Owner in writing.

3.10 SYSTEM TESTING AND STARTUP

A. In the presence of the Engineer, the Contractor shall fill the lift station and force main with clean water, bleeding all air from the force main by relief at the air relief manholes and/or cleanouts as required. The Contractor shall start and test the pumps, control system, alarm system, flow meter, gas detection system, and auto dialer. These items are described under other Specification sections. All testing shall be performed in the presence of the Engineer. Following satisfactory completion of all testing, and with the Engineer’s approval, the Contractor shall put the system into operation.

3.11 PROTECTION

A. Protect pipe from damage or displacement until backfilling operation is in progress.

3.12 INSULATION

A. Install insulation a minimum of 2' each way from centerline of pipe. Joints shall be staggered.

B. Insulation shall be installed on compacted fill 6" above top of pipe being insulated.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories.

B. Catch basins, manholes, and covers.

1.02 REFERENCE STANDARDS

A. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale); 2013 (Reapproved 2017).

B. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2022a.

C. ASTM C139 - Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes; 2017.

D. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

E. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2021.

F. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.

G. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.

H. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.

1.03 REFERENCES

A. ASTM C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

B. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets.

C. ASTM C478 - Precast Reinforced Concrete Manhole Sections.

D. ASTM C32 - Sewer and Manhole Brick.

E. ASTM C139 - Concrete Masonry Units for Construction of Catch Basins and Manholes.

F. ASTM C270 - Mortar for Unit Masonry.

G. ANSI/ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

H. Latest revision of the Wisconsin Department of Transportation (WisDOT) Standard Specifications for Highway and Structure Construction.

I. Standard Plans as noted on Drawings.

1.04 SUBMITTALS

A. Submit product data in accordance with Section 01 33 00.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 MEASUREMENT AND PAYMENT

A. Measurement and payment shall be in accordance with Section 01 20 00.

PART 2 PRODUCTS

2.01 SEWER PIPE PRODUCTS

A. Reinforced Concrete Pipe: ASTM C76, Class II, III or IV as noted with Wall Type B; mesh reinforcement; inside nominal diameter as called for on the Drawings; be bell and spigot end joints.

B. Reinforced Concrete Pipe Joint Device; ANSI/ASTM C443, rubber compression gasket joint.

C. Plastic Pipe: ANSI/ASTM D3034, SDR26, Type PSM, polyvinyl chloride (PVC) material; inside nominal diameter as called for on the Drawings; bell and spigot style with solvent sealed end joints.

D. External Sealing Bands: ASTM C877

1. “Cadilloc” hand gasket as manufactured by Cadilloc, Inc.

2. Approved Equal.

2.02 CATCH BASINS AND MANHOLES

A. Shaft Construction and Eccentric Cone Top Section: ASTM C478.

B. Brick: ASTM C32, Grade MS.

C. Concrete Masonry Units: ASTM C139.

D. Mortar: ASTM C270, Type M.

E. Adjusting Rings:

1. Rings shall be made of composite rubber and shall be installed with a polyurethane sealant per manufacturer's recommendations.

2. EJIW Infra-Riser or approved equal.

2.03 BACKFILL MATERIAL

A. Backfill shall be as specified in Section 31 20 00.

2.04 UNDERDRAINS

A. Smooth Plastic Pipe:

1. Polyvinyl Chloride (PVC) pipe meeting AASHTO M278.

2. Acrylonitrile butadiene styrene (CABS) pipe meeting ASTM D2751, SDR 35, with perforations meeting AASHTO M278, may be furnished for pipes 6" in diameter and smaller.

B. Corrugated Plastic Tubing for Underdrain:

1. Conform to AASHTO M252 for polyethylene (PE) tubing.

2. Conform to ASTM F949 for PVC tubing.

3. The perforations for both PE and PVC tubing must conform to AASHTO M252.

C. Underdrain Outlets:

1. Fabricate from PVC pipe meeting ASTM D1785 Schedule 40, ASTM D2665 or ASTM D3034 Type SDR 23.5 or corrugated steel pipe per Specifications.

D. Connections:

1. All fittings and connections used in the underdrain system must be approved by the engineer prior to installation.

2. Steel connections with tape manufactured with adhesive resistant to moisture and organic growth and recommended by the manufacturer for underground service conditions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavation base is ready to receive work, and excavations, dimensions and elevations are as indicated on Drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with material specified in Section 31 20 00.

B. Remove large stones or other hard matter which could damage drainage pipe or impede consistent backfilling or compaction.

C. Maintain and carefully protect existing live sewers and service leads during the construction of the sewers.

D. Immediately repair or replace as directed by the Engineer damaged sewer or service leads.

E. Keep service interruptions to a minimum and coordinate with the local municipality or utility company.

3.03 INSTALLATION - PIPE

A. Laying pipe shall be done in accordance with the latest revision of the WisDOT Standard Specifications for Highway and Structure Construction.

B. Contractors shall utilize laser equipment for the installation of all pipe.

C. Pipe shall be laid at the grade indication on the Drawings.

D. Invert elevations at each manhole shall be field verified and where deviations from plan elevations are encountered, the Engineer shall be notified.

E. Lay pipe to slope gradients noted on Drawings with maximum variation from true slope of 1/8 inch in 10 feet.

F. Covering and backfilling over the pipe shall be done in accordance with Section 31 20 00.

G. Increase compaction of each successive lift. Refer to Section 31 20 00 for compaction requirements. Do not displace or damage pipe when compacting.

H. Connecting to existing manhole shall be done in accordance with the latest revision of the WisDOT Standard Specifications for Highway and Structure Construction.

I. Construct drainage ditches in accordance to the grades shown and direction of flow as indicated on the Drawings.

3.04 INSTALLATION - CATCH BASINS AND MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Precast reinforced concrete units shall be constructed in accordance with ANSI/ASTM C478 and the details shown on the Drawings. They shall be constructed on precast concrete footings supported by a compacted 6-inch granular subbase.

C. Mortar: Do not use mortar that has attained initial set or has hardened to the extent that additional water is needed to restore workability.

D. Brickwork: Lay brick in all header courses in circular walls to form full and close mortar joints on their beds, ends, and sides in one operation. Make vertical joints radial from the center. Build brickwork around pipe inlets and outlets neatly; seal the pipe tightly in the wall.

E. Concrete Masonry Units: Construct walls in horizontal courses, with vertical joints broken. Lay units in mortar and fill joints completely with mortar.

F. Establish elevations and pipe inverts for inlets and outlets as indicated on the Drawings.

G. Mount lid and frame level in grout, secured to top cone section to elevation indicated on the Drawings.

H. Sewer Bulkheads and Sewer Taps shall be constructed in accordance with the latest revision of the WisDOT Standard Specifications for Highway and Structure Construction.

I. Use adjusting rings as required, but no more than 4, (3 if using infra-riser), to obtain proper rim elevations.

3.05 INSTALLATION – EXTERNAL SEALING BANDS

A. External sealing bands to be installed according to ASTM C877, and as per Manufacturer's specifications and instructions.

3.06 INSTALLATION – UNDERDRAINS

3.07 FIELD QUALITY CONTROL

A. Request inspection by Engineer prior to backfilling.

3.08 PROTECTION

A. Implement and maintain temporary erosion control measures.

B. Protect pipe from damage or displacement until backfilling operation is complete.

C. Protect manholes, and existing structures from damage or displacement until backfilling operation is complete.

D. Protect drainage ditches from erosion.

E. Correct unacceptable work at no expense to the Owner.

END OF SECTION

SECTION 35 12 13

MARINE SIGNALING EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for the installation, maintenance, and removal of all temporary marine signaling equipment required for completing the Work.

1.02 SUBMITTALS

A. Submit a Notice to Mariners to the U.S. Coast Guard for the deployment of any temporary marine signaling equipment.

PART 2 PRODUCTS

2.01 GENERAL

A. Furnish temporary marine signaling equipment that is commercially available and designed for marine use and required by USACE And USCG.

1. Anchors, if applicable, must be of sufficient weight and strength to hold the equipment in position under typically expected range of operating conditions for the area.

2.02 LIGHTS

A. Furnish navigation warning lights that conform to the United States Coast Guard requirements for location, visibility, and color.

B. Provide navigational lighting on all vessels, including scows and dredge equipment, which complies with applicable U.S. Coast Guard regulations.

C. Provide lighting for turbidity curtains and all other potential hazards to navigation put in place during the Work, in compliance with all applicable U.S. Coast Guard regulations and permit requirements.

2.03 BUOYS

A. Provide buoys that are in compliance with all applicable U.S. Coast Guard regulations.

PART 3 EXECUTION

3.01 INSTALLATION AND OPERATION

A. Coordinate with the U.S. Coast Guard and obtain all required permits and file all required notifications prior to mobilizing to the Site.

B. Furnish and maintain all marine signaling equipment required by permit and/or U.S. Coast Guard regulations while the Work is being performed.

3.02 MAINTENANCE

A. Inspect marine signaling equipment daily. Take immediate corrective action to repair/replace a malfunctioning marine signaling device.

3.03 REMOVAL

A. Remove the marine signaling equipment within 72 hours when instructed by the Owner.

B. Coordinate demobilization and removal of the marine signaling equipment with the U.S. Coast Guard.

END OF SECTION

SECTION 35 20 20

TURBIDITY CONTROLS AND ABSORBENT BOOMS

PART 1 GENERAL

1.1. SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for the installation, maintenance, and removal of all turbidity controls and absorbent booms required for completing the Work.

1.2. GENERAL REQUIREMENTS

A. The turbidity controls weight system must hold the bottom edge of the curtain in place vertically and allow for between 12 and 24 inches of clearance above the sediment surface at mean lower low water, so the curtain does not disturb sediment by repeatedly striking the bottom.

B. If constructed in panels, connect the panels to prevent suspended particles passing through the joints. Connect load lines so that the full strength of the load line is developed across the joint.

C. Provide a minimum of 4 inches of freeboard along the entire length of system, to prohibit the escape of turbid water via overtopping.

D. The Engineer will perform a water quality monitoring program as described in the RDWP. Take immediate action to rectify any deficiencies noted by the Engineer in water quality during the performance of the Work.

1.3. SUBMITTALS

A. Submit the following information on the fixed turbidity screen and moveable dredging curtain systems for review and approval as part of the Site Operations Plan:

1. Manufacturer cut sheets and specifications.

2. Description of the means and methods of installation, anchoring, maintenance, operation, and removal.

3. Shop drawings of the proposed fixed and dredging turbidity controls that detail the materials and construction of the systems.

PART 2 PRODUCTS

2.1. TURBIDIFY CONTROLS GENERAL REQUIREMENTS

A. Furnish turbidity controls that are commercially available, preassembled systems that include a geotextile, flotation system, reefing float, bottom weight, and anchoring and securing mechanism. If assembled in panels, include a secure mechanism for joining panels together.

B. Use turbidity control materials that meet the following minimum requirements:

1. Hemmed pockets that are sewn or heat bonded to the curtain flotation material and bottom weights.

2. Flotation materials that maintain buoyancy if punctured or cut.

3. A bottom weight of sufficient size to hold the system in a vertical position.

4. Anchorage lines of sufficient strength and number to support the system and its components while maintaining its position under typical operating conditions that can be expected on the Tonawanda Creek.

2.2. FIXED TURBIDITY SCREEN

A. Furnish a permeable, fixed turbidity screen for placement around the Site perimeter, as shown in the Contract Drawings, during the performance of the Work.

B. The fixed turbidity screen consists of the turbidity screen, the attached absorbent boom, flotation, reefing float, and weight materials, and all ties, anchors, and lines required to maintain its position and function.

C. Furnish a turbidity screen capable of functioning during operating conditions that can be reasonably expected when performing work on the Fox River (minimum U.S. Department of Transportation Type II or better).

2.3. MOVEABLE DREDGING CURTAIN

A. Furnish an impermeable, moveable dredging curtain for placement around the active dredging area during the performance of the Work.

B. The moveable dredging curtain consists of the turbidity curtain, attached absorbent booms, turbidity curtain frame, flotation and weight materials, and all ties, anchors, and lines required to maintain its position and function.

C. Furnish a turbidity curtain capable of functioning during operating conditions that can be reasonably expected when performing work on the Tonawanda Creek.

2.4. ABSORBENT BOOM

A. Furnish unused, commercially available, oil absorbent booms with end-ties that enable a continuous length of boom to be deployed without gaps.

B. The absorbent boom must be capable of being attached to the inboard side (dredging side) of the turbidity controls without reducing the effectiveness of the turbidity control or the boom.

2.5. MOVEABLE DREDGING CURTAIN FRAME

A. Furnish a moveable dredging curtain that can be relocated around the Site, as needed. Perform all dredging work within the confines of the moveable dredging curtain.

B. Furnish a rigid frame of sufficient strength to support and maintain the position of the moveable dredging curtain, absorbent boom, and all other components during the performance of the Work.

C. The maximum dimensions of the moveable dredging curtain are to be 40 feet by 40 feet in plan view, unless a request for an alternate shape is proposed by the Contractor and subsequently approved by the Engineer.

PART 3 EXECUTION

3.1. INSTALLATION

A. Install the fixed turbidity screen, as shown in the Contract Drawings, prior to performing any Work that may disturb sediments and/or create turbid water.

B. Place the turbidity screen in a furled condition. Do not allow the anchors to sink until the screen has been appropriately positioned.

C. Tie the absorbent booms to the inboard side (dredging side) of the turbidity controls to form a continuous line of boom.

3.2. MAINTENANCE

A. Inspect the turbidity controls and absorbent booms daily. Perform additional inspections, as may be needed, during inclement weather or after accidental vessel strikes.

B. The following conditions constitute inadequate performance of the turbidity curtains and require immediate maintenance and/or corrective action:

1. Any visible plume of cloudy water, or sheen, passing beyond either the moveable or fixed turbidity controls.

2. Exceedance of the water quality criteria, as measured at the water quality monitoring stations located outside the fixed turbidity curtain, if determined by the Engineer to be caused by Work related activities.

C. Take immediate action to correct inadequate performance of the turbidity curtains.

D. Maintain the turbidity controls in place until the construction activities have been completed and the turbidity of the water enclosed is reduced to acceptable levels, as determined by the Engineer.

E. Remove the turbidity controls within 72 hours of receiving notification to do so from the Engineer.

F. Maintenance includes, but is not limited to, the re-positioning of the turbidity controls if they become accidentally dislodged, any re-positioning/re-installation needed because of the Contractor’s operations, and performing any repairs, as directed by the Engineer.

3.3. REMOVAL

A. Minimize the disturbance of sediments when removing the turbidity controls. Do not drag the system, or anchor lines, on the sediment surface during removal.

END OF SECTION

SECTION 35 20 23

DREDGING BY MECHANICAL METHODS

PART 1 GENERAL

1.01 SUMMARY

A. The Work required under this section includes furnishing all labor, materials, equipment, and performing all operations required for completing the mechanical dredging portion of the Work.

1.02 SCOPE OF WORK

A. The work under this section shall include, but not be limited to, the following:

1. Site mobilization & demobilization.
2. Demobilization(s) & Remobilization(s) as required to suit project phasing.
3. Project scheduling and phasing.
4. Phased dredging by mechanical method to the depths and limits shown on the Contract Drawings. The dredging requires sequencing to separate different materials according to upland placement location. The Contractor must comply with all permit conditions and shall schedule his work accordingly.
5. Placement of dredged material into scow or other approved transport container, in conformance with the Contract Documents and all Regulatory Approvals.
6. Handling and segregation of dredged material according to placement location in conformance with the Contract Documents and all Regulatory Approvals.
7. Transportation and placement of Organic Material in the Bay Port Dredged Material Re-Handling Facility (Bay Port) in conformance with the Contract Documents and all Regulatory Approvals.
8. Transportation and placement of native material (Clay Material) on the project site in conformance with the Contract Documents and all Regulatory Approvals. Clay Material shall be further processed in accordance with the specifications for use as Engineered Fill.
9. Compliance with all US Army Corps of Engineers (USACE) and U S Coastguard (USCG) requirements.
10. Compliance with all conditions within the Regulatory Approvals as attached in Appendices including, but not limited to:
    a. Reporting
    b. Decontamination for invasive and exotic species
    c. Preparation of turbidity abatement plan(s)
11. Removal and proper disposal of debris and other obstructions found within the dredge limits as defined within these Specifications at the Brown County South Landfill.
12. Preparing, receiving, and acceptance by the Owner of all submittals outlined in Section 1.06 of this Specification.

B. Comply with all applicable regulations, rules, laws, and ordinances of the State of Wisconsin, and all other authorities having jurisdiction including, but not limited to, the USACE, U.S. Coast Guard, and the City of Green Bay. Provide without additional costs to the Owner, all labor, materials, equipment and services necessary to comply with such requirements.

C. Comply with all conditions within the Regulatory Approvals including, but not limited to, the following:

1. US Army Corps of Engineers (USACE) permit.
2. State of Wisconsin Department of Natural Resources – Water Quality Certification
3. State of Wisconsin Department of Natural Resources – Permit for Stream Dredging
4. State of Wisconsin Department of Natural Resources – Artificial Wetland Exemption Determination

D. Contractor shall comply with all conditions and perform monitoring and reporting as required by the Regulatory Approvals including:

1. Monitoring during all dredging, upland transfer and disposal
2. Preparation of a turbidity control plan(s)
3. Preparation and submission of all required reports
4. Time of year restrictions

E. In the event that any conflict between conditions in the Regulatory Approvals and the Contract Document occurs, the Contractor shall comply with the more stringent requirement at no additional cost to the Owner.

F. Examine all Contract Drawings and sections of the Specifications for requirements and provisions of the Work that this Section affects.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. The following items of related work are specified and included in other Sections of the Specifications:

1. Site Preparation under SITE PREPARATION, SECTION 02 10 00.
2. Demolition under DEMOLITION, SECTION 02 14 00.
3. Earthwork under EARTHWORK, SECTION 31 20 00.
4. Environmental Controls under TEMPORARY ENVIRONMENTAL CONTROLS, SECTION 01 57 19.

1.04 CHARACTER OF MATERIALS

A. Material designated as “Organic Material” within the dredging limits consists of a range of materials including loose sands, dark brown/black organic or inorganic silts, loose sand and gravel and any other material so designated by the Engineer. The Contractor should anticipate that Organic Material will also contain miscellaneous debris including, but not limited to, concrete, bricks, metals, riprap, timber, trash, etc. Debris shall be segregated from the remaining Organic Material and shall be disposed of separately in accordance with the Contract Documents. Debris shall be defined as individual single pieces larger than 24 inches in any dimension. All other Organic Material shall be transported and placed at the Bay Port Facility in accordance with the Contract Documents.

B. Material designated as “Clay Material” within the dredging limits consists of soft to stiff clays with varying proportions of silt and containing some sands, gravels, cobbles and boulders. All Clay Material shall be transported and placed for use as Engineered Fill on the project site. All cobbles and boulders larger than 12 inches shall be segregated and used for marine stone fill.

C. The existing shoreline is an historic filled shoreline and boat slip. Demolition and clearance of the remaining shoreline structures is specified in Section 02 41 00 but the Contractor shall anticipate that debris from the shoreline is present in the material to be dredged including, but not limited to, vegetation, rip rap, concrete, old timber bulkheads, etc. Demolition material generated from this project shall not be mixed with Dredged material.

1.05 QUALIFICATIONS

A. The Contractor shall have completed at least 5 dredging projects of similar size, scope and value using mechanical methods with upland disposal.

B. The dredging supervisor shall have a minimum of 5 years of experience with dredging projects in the role of dredging supervisor or superintendent.

C. The Contractor’s equipment operators, supervisory engineering staff, and technical staff shall have a minimum of 2 years of experience with dredging via mechanical methods.

1.06 QUALITY ASSURANCE

A. Comply with all applicable local, state, and federal requirements, as well as industry standards and practices regarding materials, methods of work, proper disposal, safety of workers, and safety of the public.

~~B.~~ Copies of the Regulatory Approvals and Conditions for performing the work or examples thereof are included within the Bidding Documents. The Contractor shall be responsible for understanding and implementation of the stipulated conditions as a condition of this contract.

C. All the Contractor’s dredging equipment and dredge scows shall be in good working condition and suitable for the intended task.

D. Dredging and disposal will only be allowed during specified times established by the Regulatory Approvals. The Contractor shall be responsible for adhering to all local, state, and federal requirements for protection of aquatic life.

E. Should it become necessary for work under this section to extend into the no dredging/disposal windows, the Contractor will be responsible, at his expense, to obtain approvals for any time extensions, re-permitting, or changes that may be necessary.

1.07 SUBMITTALS

A. Dredging Plan:

1. Within fifteen (15) calendar days from the date of the Notice to Proceed, or at the pre-construction meeting, whichever occurs first, submit the Dredging Plan to the Owner for review and acceptance.

2. Include the name, address, and 24-hour emergency contact information of the person who will be in responsible charge of the dredging and disposal operation.

3. Include the name, address, and 24-hour emergency contact information of all Subcontractors who will be involved in the Project.

4. Identification and list of dredge equipment to be used. Certify that all the Contractor's dredging equipment and dredge scows are in good working condition and suitable for the Work. All equipment is subject to inspection and approval prior to use on the Project.
5. Written Sequence of Operations including details of all Dredging Buckets to be used and compliance with requirements to ensure no adverse impacts as a result of work in proximity to engineered caps containing contaminated sediments.
6. Plan for dredge area and dredge disposal location monitoring.

B. Submit a Spill Management Plan which will be utilized to prevent and/or mitigate fuel and material spillage.

C. Submit a Material Management Plan for dredged material upland transfer, dredged material transport to Bay Port and on-site containment and dewatering.

D. Construction Schedule/Phasing Plan for all work including schedule for dredging.

E. Contractor shall submit copies of all notifications to regulatory agencies or other authorities and associated documentation that the notification was received by the appropriate authorities.

F. Reports and Plans:

1. Within seven (7) calendar days from the date of the Notice to Proceed or at the pre-construction meeting, whichever occurs first, the Contractor shall submit to the Owner for approval, the Spill Management Plan which will be utilized to prevent and/or mitigate fuel and material spillage.
2. Prior to mobilizing any equipment or materials to the Site, the Contractor shall submit to the Owner for approval, the Sequence of Operations and the Material Management Plan.
3. The Contractor shall submit to the Owner, prior to the pre-dredge survey, his survey control plan which shall include a written sequence of operations, location of survey controls and locations of markers. The Contractor shall submit, with this plan, the material and installation procedures for the markers.
4. The Contractor is required to plot the locations of all obstructions encountered during the progress of the Work on the progress plan and on the Daily Reports.
5. Maintain a dredging progress plan onsite and update it daily. This plan shall be colorized and show the locations dredged and the date of the work. The dredging progress plan will be submitted to the Owner at the completion of the Work.
6. Maintain an upland placement progress plan onsite that is updated daily to show all work in the Bayport Disposal Facility and on the project site. This plan shall show locations of all material placed with dates/time. The upland placement progress plan will be submitted to the Owner at the completion of the Work.

G. The Contractor's hydrographic multi-beam surveys, when performed, shall be provided at the same size and scale as the Contract Drawings and shall show the final elevations of the dredged area with all pertinent data, landmarks, baseline, and shall be based on the datum established for the project on the Contract Documents. Data grid used shall be sufficient to provide adequate details of the side slope and the limit of dredging. The Owner may request additional data sets as required to review the Contractor's data. Submittal shall include hard copies as well as supporting electronic files. All surveys shall be performed using the same horizontal coordinate system and vertical datum based on project datum, unless noted otherwise.

H. Surveys submitted for consideration shall have an original stamp by a licensed professional land surveyor or licensed professional engineer. Stamped plans shall be on paper copies and may be submitted for the following purposes:

1. Disagreement with pre-dredge condition – must be submitted at least 1 week prior to performing any dredge activities.
2. Requests for partial payment of dredge activities.
3. Verification multi-beam survey to confirm work is complete.
4. Disagreement with post-dredge condition and payment volumes.

I. Submit a Turbidity Monitoring and Control Plan for review and acceptance by the Owner and Regulatory Agencies prior to mobilizing any equipment or materials to the Site.

J. Certificate of Compliance

1. The Contractor shall provide name and contact information for the Registered Land Surveyor, Registered Professional Engineer, or Certified Hydrographer, experienced in hydrographic surveys, to perform its verification survey and prepare the required plan.
2. The Contractor's verification survey shall be the same size and scale as the Contract Drawings and shall show the final elevations of the dredged area with all pertinent data, landmarks, baseline and shall be based on the Datum established for the project.
3. The Contractor's verification multi-beam survey will not be considered for payment purposes but it must be sufficient in detail and accuracy to satisfy the Owner that the Owner’s final survey can be ordered.

K. The Contractor will be required to maintain daily records of dredging operations. A plan will be marked and colored coded showing daily progress, and a sketch of this progress plan indicating the work accomplished for that period will be drawn on the back of the record forms. The record forms shall be submitted to the Owner on a weekly basis. The progress plans will be turned over to the Owner at the completion of work.

1.08 NOTIFICATIONS

A. Provide notifications required by Regulatory Approvals in compliance with the notice period prior to the beginning of dredging including, but not limited to:

1. Notify the USACE of intent to start Work at least 10 days prior to the beginning of dredging.
2. Notify the Wisconsin Department of Natural Resources at least 10 days prior to the beginning of dredging.
3. At least ten (10) working days in advance of the start date, the Contractor shall notify the Great Lakes Coast Guard District, Aids to Navigation Team, of the location and estimated duration of the dredge and disposal operations.
4. Notify and coordinate all work with the Owner.

B. It is the Contractor's responsibility to notify the US Coast Guard and USACE prior to the start of this Project.

C. Before mobilization of any equipment or beginning any dredge or disposal operations, the Contractor shall coordinate with the US Coast Guard to issue a “Notice to Mariners”.

D. If the Owner is not present onsite, it is the Contractor's responsibility to immediately notify the Owner of any changes in the Site so that the Owner may inspect the conditions.

E. Upon completing the dredging of each type of material, the Contractor shall perform a verification multi-beam survey by a Registered Land Surveyor or a Registered Professional Engineer. This survey shall be submitted to the Owner with a letter notifying the Owner that the work is complete, and the final Owner survey can be ordered.

1.09 SITE CONDITIONS

A. PROJECT STAGING

1. All staging shall be within the limits of the project site or the Contractor may provide their own site for these activities at no additional cost to the project. Any use of the project site for these activities shall be subject to the review and approval of the Owner.

B. SITE ACCESS

1. Contractor shall note that the area to be dredged has limited access, depth and size restrictions and will require selection of materials and equipment that are capable of safely navigating within the site restrictions shown on the Contract Drawings.

C. SITE INFORMATION

1. Data on indicated conditions are not intended as representations or warrants of continuity of such conditions between inspection locations or sample locations. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Data is made available for the convenience of the Contractor.

2. Additional test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner.

1.10 CONTRACTOR SURVEYS

A. QUALIFICATIONS

1. To support applications for progress payments, subcontract with a licensed in the State of Wisconsin to serve as the independent surveyor for the Project.

2. The surveyor shall have served in a similar role on at least five previous Projects with a dredging component of a similar or greater size.

3. The selected surveyor may not be replaced unless the Contractor submits a written request to the Owner for approval that details the reason(s) for the requested change and includes any noted deficiencies.

B. REFERENCE POINTS

1. Establish horizontal control points and benchmarks, as needed. Protect the reference points from disturbance during performance of the Work.

2. When laying out and controlling the performance of the Work, use horizontal and vertical datums that are consistent with those used in the Contract Drawings.

C. HYDROGRAPHIC SURVEYS

1. Hydrographic surveys shall be conducted to meet USACE accuracy standards defined in USACE Manual EM 1110-2-1003, Hydrographic Surveying. Surveys will be performed by multibeam sweep methods. The operating acoustic frequency will range from 180 kHz to 250 kHz. All depth measurement devices, positioning, and motion compensation systems will be calibrated following the quality control procedures outlined in EM 1110-2-1003.

2. At the start of each day's soundings, the system shall be calibrated in strict accordance with EM 1110-2-1003. The Contractor will be required to submit to the Owner sufficient field data, including all digital fathometer data in a usable format, corrected for tide, and corresponding boat plots and track sheets, so that the Contractor's submitted survey plot may be reproduced by the Owner by referring only to this field data.

3. After completion of the Contractor's survey, the results will be plotted and reviewed by the Contractor to ensure that all Work was completed in accordance with contract requirements, and then submitted to the Owner by electronic file transfer in digital ASCII format. If deficiencies are noted, a re-survey of the area after correction of deficiencies will be required to assure the Owner that appropriate corrections have been made.

4. Submission of all Contractor quality control survey data, including plots, is required prior to the performance of the final examination and acceptance survey to be performed by the Owner. The results of the quality control surveys should be used by the Contractor to ensure that Work was performed in accordance with the Contract Documents.

5. If requesting a progress payment, surveys shall be performed by the Contractor for all completed areas of dredging being submitted for payment. All data shall be submitted by electronic transfer with XYZ ASCII files containing Easting, Northing, and true Elevations relative to the Project vertical datum. Data shall be provided to the Owner denoted by shallowest soundings in a 3-foot grid pattern. The files shall be referenced to state plane coordinates and vertical datum referenced to the Project vertical datum.

D. ENVIRONMENTAL PROTECTION

1. Comply with all Federal, State and local regulations pertaining to water, air and noise pollution.

2. Comply with all conditions of all regulatory approvals including supply and installation of all required equipment, submittals, notifications, monitoring and reporting.

3. The Contractor shall adhere to all requirements including any time of year (TOY) restrictions for the protection of fisheries resources.

4. The Contractor shall implement a turbidity monitoring program during all dredging and ensure that turbidity levels remain at levels no greater than 40 Nephelometric Turbidity units (NTUs) above background levels measured upstream. The Contractor shall prepare and submit a turbidity monitoring plan for review and approval at least 7 days prior to any dredging. If turbidity levels exceed a 40 NTU increase, the Contractor shall propose measures to reduce the turbidity such as slowing the rate of dredging until the level is reduced below 40 NTUs.

5. The Contractor shall provide and maintain all required environmental protective measures for the duration of the dredging. The Contractor will remain responsible to correct any deficiencies or conditions arising during the work such as spills.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.01 SCOPE OF WORK

A. General

1. The Contractor shall dredge to the depths shown on the Contract Drawings. The proposed depths include an over-dredge payment limit depth as shown on the Contract Drawings. No work outside the payment limit will be considered for compensation.
2. The Owner will perform a Pre-Dredge survey of the project area before any work is started. The Pre-Dredge Survey shall be the basis of pre-dredge conditions for payment purposes instead of the Contract Drawings.
3. The Contractor shall place and maintain range markers to show the limits of the dredge area. Markers shall not be located to cause an obstruction or other hazard for vessels.

B. Site Mobilization & Demobilization

1. The Contractor shall mobilize dredging plant, work boats, scows, barges, tugs, cranes, and all other equipment to the work site to commence dredging and disposal operations
2. The Contractor shall relocate and move cranes, dredge plant, and related equipment from one work location to another work location(s) within the project limits as work progresses and to accommodate vessel operations, as required.
3. The Contractor shall perform all survey for layout, placement, and maintenance of markers, as well as the verification survey. Survey control baseline(s), markers and tide boards shall be established and maintained at all times during the project for the dredging area.
4. The Contractor shall perform all notifications, as required under this specification and within the Regulatory Approvals.
5. Provide all materials, equipment and labor as required to fully comply with all Regulatory Approvals.
6. The Contractor shall perform all surveys and reports, as required under this specification.
7. Demobilization of the Contractor's dredging plant, work boats, scows, barges, tugs, cranes, and all other equipment from the work site upon completion of the dredging operations shall only take place after receiving approval from the Owner.
8. Under no circumstances shall the Contractor leave the site until the Owner has completed his final payment survey and has notified the Contractor in writing that he may demobilize from the site, or unless otherwise authorized in writing by the Owner. If any work has not been completed, including complete demobilization, or, if any shoals exist within the work area the Contractor will be ordered to return to the site to complete said work without delay. If the Contractor does not return to the site all monies owed the Contractor shall be retained by the Owner to

complete the work, any funds not utilized to complete the work will be paid to Contractor.

9. The Contractor shall have a motorboat and operator available to assist the Inspector and Owner Representative on inspection, water quality monitoring and survey control throughout the duration of the project.

C. Dredging

1. Refer to 3.04.

3.02 PRE AND POST CONDITION SURVEY

A. Contractor shall perform photographic or video survey of existing site conditions of the shoreline and boat slip outside the limits of the proposed bulkhead. The contractor will be responsible for restoration of any destabilized, eroded or collapsed shoreline or shoreline structures not within the limits of the proposed bulkhead.

B. Contractor shall locate and mark the limits of all engineered caps within 100 feet of the proposed dredging.

C. The Contractor may perform intermittent bathymetric surveys as required to complete their work, at no additional cost to the Owner. Intermittent surveys performed are not required to be multi-beam; however, the final Verification Survey shall be multi-beam.

3.03 GENERAL OPERATIONS

A. Conduct operations in such a manner as to cause the least amount of interference with shipping and boating interests in and around the Site. The Contractor shall direct the shifting or moving of dredges or the interruption of dredging operations to accommodate the movement of vessels and floating equipment, if necessary.

B. Coordinate all Work with:

1. The Owner.

2. USACE.

3. U.S. Coast Guard.

C. Contractor shall notify Owner 48 hours prior to any dredging activities.

D. The Contractor shall have full responsibility for all phases of the work operations.

E. All equipment shall be maintained in good operating condition.

F. All floating plants used for gathering and hauling dredged materials shall have the load compartments sealed shut. There shall be no means for dredged materials to exit the vessel below the water line. Prior to using any vessel for gathering and transporting dredged materials on this project, bottom gates and valves shall be temporarily welded closed and operating mechanisms disengaged throughout the course of the work. The Contractor shall provide the Owner an opportunity to inspect each vessel in an empty condition to verify the required sealing has been performed. Throughout the course of the work, the Owner shall have the right to re-inspect the vessels to verify the required sealing is well maintained.

G. Provide and maintain a walkie-talkie communication system, or other system approved by the Owner, between the Owner and the dredge plant, and between the towboat and the scow.

H. Barges, dredge plants, tow boats or any vessel used during this project will not be permitted to sit on the bottom within or adjacent to the project work area.

I. Barges, dredge plants, tow boats or any vessel used during this project will not be permitted to anchor or spud into the engineered sediment caps without written permission from the WDNR and Responsible Parties.

J. After the dredging is completed and all areas identified as needing additional work have been remedied; the Contractor shall have a verification survey made by a Registered Land Surveyor or Registered Professional Engineer. This survey is to be submitted to the Owner with notification that the dredging is complete and the final Owner survey may proceed.

3.04 DREDGING

A. The material to be removed to accomplish the specified dredging work is as described at 1.03. The Contractor shall examine the work site and available data and determine for himself the character of the materials to be removed. The Contractor is required to remove all materials within the design footprint and shall provide all necessary labor and equipment to handle the materials described.

B. Dredging shall be phased by the Contractor to coordinate with the dock wall construction to allow removal of Organic Material as required to comply with dock wall construction sequence and to allow for segregation of Organic Material and Clay Material.

C. Furnish equipment of sufficient size and capacity to dredge sediments to the depths shown on the Contract Drawings. The Contractor shall dredge by mechanical methods the areas shown on the Contract Drawings.

D. Dredged material shall be placed in approved transport containers that meet Owner and USACE requirements. Overflow from the approved containers will not be permitted.

E. The quantities shown on the plans are estimated based on the survey and soundings. The actual amount removed will be dependent on the amount of material the Contractor removes to the payment limits as shown on the Contract Drawings. Intermittent progress hydrographic surveys may be conducted by the Contractor for progress payments, if desired. Quantity removed will be obtained by computing the volume between the bottom surface of the last Owner survey made before dredging, and the bottom surface of the final Owner survey made within one week or otherwise as soon as practicable after the work specified has been completed. The Contractor must complete a post-dredge survey within 5 days of completing dredge activities and notify the Owner of when post-dredge survey is scheduled to be completed. The Owner will complete its own post dredge survey for verification and agreement of post dredge conditions and final payment.

F. Unless approved in advance by the Owner, payment will only be made on the computed volume of the dredge prism to the payment limit shown in the Contract Drawings, including side slopes.

G. Minimize over-dredge. The Contractor may be directed by the Owner to fill over dredged areas with clean material at no additional cost to the Owner. Filling the over dredged areas may require permit modifications which shall be obtained by the Contractor.

H. Do not exceed the maximum dredge cut line at the base of side slopes. Remove any upslope sediments that fall into the dredge prism.

I. Dredging performed beyond the limits of the allowable over-dredge will not be measured for payment. Additionally, any other pay items impacted by the performance of dredging beyond the allowable dredge limits will not be measured for payment.

J. Make the bottom of the excavation as smooth and level as possible at or within 2 foot above the plane of the payment limits shown. All bumps, shoals, pinnacles or any other obstruction above the minimum dredge depth are to be removed. No payment will be

made for any material dredged beyond the payment limits as shown on the Contract Drawings as determined from information obtained during the Owner post-dredge survey.

K. The method used to obtain a smooth and level bottom shall be selected by the Contractor, with the approval of the Owner, before such method is implemented.

L. If the Owner post-dredge survey shows areas that have not been dredged to the proper depth, the Contractor shall complete the Work required as directed by the Owner and shall pay for the additional survey(s) required to show that the Work has been completed per the Contract Documents.

M. The Owner will notify the Contractor in writing, upon the receipt and approval of the final survey, that the Contractor may demobilize from the Site. The Contractor shall not demobilize from the Site without the prior written approval from the Owner.

3.05 DEBRIS AND OBSTRUCTIONS

A. The Contractor shall assume debris is present and shall remove it in the course of his work. In the event, significant obstructions are encountered which may impact the progress of the work, the Contractor shall notify the Owner prior to removal.

B. Debris and other unsuitable material that is dredged from within the dredged footprint but is unsuitable for disposal with the dredge spoil, as described within these specifications or otherwise unsuitable as determined by the Owner or Regulatory Agencies, shall be separated and placed in a separate unsuitable material dumpster. Debris placed in the dumpster shall be free of excessive dredge spoil and water. All such material shall be disposed at the Brown County South Landfill in accordance with the Contract Documents or as otherwise directed by the Owner.

C. Furnish any special or additional equipment that may be required for removing debris and submerged obstructions as needed to complete the Work. Care must be taken when removing any debris encountered adjacent to existing structures to minimize any possible impact.

D. Separate any floating debris contained within the turbidity controls and stockpile for offsite disposal.

E. Lawfully dispose of debris in accordance with all applicable laws and regulations.

F. The changing of dredging bucket type or of dredging platform to remove debris is to be included in the Contractors Bid and will not be considered adequate grounds for a Change Order.

G. Any material that is disposed of other than in places designated by the Owner will not be paid for and the Contractor may be required to remove such misplaced material and deposit it where directed at no additional cost to the Owner.

3.06 DREDGE MATERIAL TRANSPORT AND DISPOSAL

A. Transport, monitoring, and disposal of dredge material shall be in accordance with all regulatory requirements and the Contractor shall be solely responsible for proper disposal of material.

B. The Contractor shall bear full responsibility for resolution of issues arising from the transport, monitoring, and disposal of dredge material in violation of regulatory requirements, including but not limited to meetings, surveys, environmental studies, and mitigation. No additional compensation from the Owner shall be made to address permit violations.

C. The Contractor shall be responsible for all loading, unloading and transport of dredge material to disposal sites.

D. Contractor shall be responsible for all requirements to transfer material to upland within the Project Site including, but not limited to, all labor, materials, equipment, supervision, submittals, material containment, environmental protection and controls, monitoring, clean up and disposal of all surplus materials.

E. The method employed by the Contractor in conveying dredged materials to the disposal area (Bay Port facility) shall be as approved by the Owner at all times. Temporary dumping or placement of materials outside of the disposal area for subsequent rehandling into the disposal area is prohibited unless otherwise approved by the Owner.

F. All nautical vessels, and land-based transport and conveyance systems shall be operated, loaded and unloaded in such manner as to prevent overflow, spills, leaks, waste, or other loss of dredged materials between point of pick-up and point of deposition within the disposal area. Hauling vessels shall have sufficient sidewall height and integrity to prevent drainage over or through the sides and bottom during hauling.

G. All vehicles used to convey dredged materials shall have leak tight cargo bodies or compartments with spill and splash preventing devices as well as necessary sidewall height. Vehicles shall not be loaded over their capacity, nor shall any loads exceed the limits of the thoroughfare over which the vehicles are operated. If the dredged materials are transferred from vessels to vehicles by bucket type equipment or any device which may leak or spill, provisions shall be made to prevent water and materials from escaping into the waterways. In addition, the Contractor shall insure that materials that are splashed around vehicles during loading or unloading operations are cleaned up prior to the vehicle leaving the site so as to prevent materials from being tracked on to public thoroughfares or escaping into the waterways. The Contractor shall immediately clean up any materials spilled on the public thoroughfares. In addition, the Contractor shall maintain the transfer site in a neat and orderly condition.

H. Other than for public roadways, the Contractor shall provide its own haul roads into the Bay Port disposal area as required for its operations and shall maintain them throughout the course of the work. If existing vehicle paths are used (which are not dedicated as public roadways) the Contractor shall provide any improvements required to support its vehicle traffic and shall maintain such haul roads in a condition satisfactory for travel in a passenger automobile at all times, including at the completion of the contract.

I. Contractor shall be responsible for transportation and placement of Clay Material for processing to Engineered Fill on the project site in conformance with the Contract Documents and all Regulatory Approvals.

J. Organic Material shall be deposited within the Bay Port disposal area at a location as directed by the Owner. Except as otherwise authorized by the Owner in writing, no disposal shall be performed unless a representative of the Contractor for Quality Control is present at the time. The method employed by the Contractor in depositing dredged materials in the disposal area shall be as approved by the Owner at all times. Any material that is deposited elsewhere than in the places designated in this contract or approved by the Owner will not be paid for. The Contractor shall be required to remove such misplaced material at his own expense and deposit it in the place designated in this Contract.

K. Dredged materials shall be placed at the Bay Port facility as directed by the Owner. Only dredged materials taken from within the limits of this contract and as otherwise required shall be placed in the Bay Port facility. The Contractor shall coordinate its disposal operations with others who may be simultaneously utilizing the disposal facility.

3.07 PROTECTION OF EXISTING STRUCTURES AND SHORELINE

A. Proposed dredging limits as shown on the Contract Drawings are in close proximity to existing and proposed structures. The Contractor shall take necessary precautions to

protect these structures from damage. The Contractor shall bear full responsibility for any damage of any nature to these structures caused by his workers and/or equipment, and any such damage shall be satisfactorily remedied at the sole expense of the Contractor to the satisfaction of the Owner.

B. Conduct dredging operations such that they do not undermine, weaken, or otherwise impair any structures or shorelines located in or near the areas to be dredged. The Contractor shall investigate the Site and plan the dredging operations accordingly.

C. The Contractor shall be held responsible for any damage to the existing facilities resulting from dredging and dredging operations.

3.08 INSPECTIONS

A. Contractor shall coordinate all surveying with dredging efforts.

B. Furnish, upon request of the Owner, the use of such boats, boatmen, laborers, and material forming a part of the ordinary and usual equipment and crew of the equipment or marine plant as may be reasonably necessary in inspecting and monitoring the Work. The Contactor shall furnish, on request of the owner, suitable transportation from all points on shore to and from the various pieces of the marine plant and the Site.

END OF SECTION

SECTION 35 59 33

MARINE BOLLARDS AND CLEATS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work under this Section, without limiting the generality thereof, consists of manufacturing or shop-fabricating metal elements, itemized under MATERIALS in this Section and installation of all materials, equipment, labor, transportation facilities, and all operations and adjustments required for the complete and operating installation as indicated on the Drawings, stipulated in the Specifications and as reasonably implied by either or both. This includes, but is not limited to the following:

1. 100 metric ton Bollard
2. All tie rods, hex nuts, jam nuts, washers, bearing plates, concrete foundations, geotextiles, stone, anchors, hardware templates, coatings, grouts, required for a fully functional and safe vessel mooring system.
3. Should drawings not agree within themselves or the specifications, the greater quantity, or superior quality of work or materials shall be included.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:

A. The following items of labor and/or materials and equipment are furnished and/or installed under other Sections of the specifications.

1. Concrete and concrete grout under REINFORCED CONCRETE, SECTION 03 31 30
2. Metal fabrications under METAL FABRICATIONS, SECTION 05 50 00
3. Miscellaneous Metals under MISCELLANEOUS METALS, SECTION 05 50 13

B. Examine all Drawings and all Sections of the Specifications for requirements and provisions affecting the work of this Section.

1.03 QUALITY ASSURANCE

A. Except as noted elsewhere, work shall conform to the following codes and standards:

1. American Society for Testing and Materials (ASTM).
2. American Welding Society (AWS).
3. American Institute of Steel Construction (AISC).
4. The Commonwealth of Massachusetts, Department of Public Works "Standard Specifications for Highways and Bridges" (latest edition). (MHD)

1.04 SUBMITTALS

A. Shop drawings for all items shall be submitted to the Engineer for approval before beginning fabrication.

B. Certificate of compliance with applicable ASTM specifications for all galvanized items shall be submitted to the Engineer with all materials delivered to the fabricator or site.

C. Manufacturer's literature, certificate of compliance with applicable ASTM, and specifications for all fasteners, expansion bolts, and other connection items identified within the contract drawings and/or recommended by manufacturer.

D. List of all other hardware with quantities and material specifications.

1.05 PRODUCT HANDLING

A. All materials shall be delivered, stored, and handled with care to prevent damage to any material or material coating. Material damaged or with damaged coating will be rejected and replaced at no additional cost to The Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Bollards shall be a T-Head Bollard with working capacity in metric tons to meet the requirements of the Contract Drawings.

B. All bolts for steel connections shall conform to ASTM F3125, Grade 325 for Steel Bolts with manufacturer markings that indicate such unless otherwise noted.

C. Threaded rod anchors shall be Hot Dip Galvanized F1554 Grade 55 unless otherwise noted.

D. Tie Rods for Bollard Foundations shall conform to ASTM A615 and shall be 1-3/4” diameter all thread bar with a minimum yield strength of 175 kips. All tie rods shall be epoxy coated to ASTM A775 or hot dip galvanized to ASTM A153.

E. All steel items that are not otherwise coated under this section shall be hot dipped galvanized unless noted otherwise. Galvanizing shall be by the hot dip method according to ASTM Specifications A-123 and A-153.

F. Epoxy grout for epoxy anchors shall be Hilti HIT-RE 500, Redhead G5, AC Powers 100+ Gold or equal approved.

G. Bollard coating shall be high solids epoxy coating, final color yellow.

PART 3 EXECUTION

3.01 INSTALLATION

A. Parts covered by this specification shall be installed in the work as shown on the drawings.

B. No cutting or burning of steel shall be done to install fasteners without approval of the Engineer.

C. All epoxy anchors shall be installed fully in accordance with manufacturer’s recommendations including hole drilling, cleaning and anchor installation.

D. Bollards shall be recessed into concrete and installed on grout bed. Anchor bolts recesses shall be filled with grout or as otherwise directed by manufacturers recommendations.

3.02 DEFECTIVE WORK

A. The following shall be grounds for rejection and replaced at no additional cost to the Owner:

1. Any damaged parts.
2. Any parts improperly installed in the work.
3. Any items found not to have the proper coating.
4. Otherwise not according to Contract Documents.

END OF SECTION