CONSTRUCTION REQUEST FOR PROPOSAL

RFP #22-53

Valve and Finished Water Tank & Reservoir Improvements

City of Ann Arbor
Water Treatment Services Unit

Due Date: Thursday, July 7, 2022 by 2:00 p.m. (local time)

Issued By:

City of Ann Arbor
Procurement Unit
301 E. Huron Street
Ann Arbor, MI 48104

STATE OF MICHIGAN
JOSEPH CHRISTIAN SIWEK
ENGINEER
No. 6201055740
LICENSED PROFESSIONAL ENGINEER
6-1-2022

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SECTION I - GENERAL INFORMATION

A. OBJECTIVE

The purpose of this Request for Proposal (RFP) is to select a firm to provide construction services to complete work at the Ann Arbor Water Treatment Plant including the replacement of existing valves, improvements to existing utility structures, and the recoating of existing process piping. The work also includes miscellaneous improvements at multiple finished water storage tanks and reservoirs including steel pipe and surface recoating, access and ventilation improvements, and overflow piping replacement.

B. QUESTIONS AND CLARIFICATIONS / DESIGNATED CITY CONTACTS

All questions regarding this RFP shall be submitted via e-mail. Questions will be accepted and answered in accordance with the terms and conditions of this RFP.

All questions shall be submitted on or before Tuesday, June 14, 2022 at 3:00 p.m. (local time), and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to Emily Schlanderer, PE at ESchlanderer@a2gov.org

RFP Process and Compliance questions shall be e-mailed to Colin Spencer, Buyer - CSpencer@a2gov.org

Should any prospective bidder be in doubt as to the true meaning of any portion of this RFP, or should the prospective bidder find any ambiguity, inconsistency, or omission therein, the prospective bidder shall make a written request for an official interpretation or correction by the due date for questions above.

All interpretations, corrections, or additions to this RFP will be made only as an official addendum that will be posted to a2gov.org and MITN.info and it shall be the prospective bidder's responsibility to ensure they have received all addenda before submitting a proposal. Any addendum issued by the City shall become part of the RFP, and must be incorporated in the proposal where applicable.

C. PRE-PROPOSAL MEETING

A pre-proposal conference for this project will be held on **Thursday June 9, 2022 at 1:00 p.m. at 919 Sunset Road, Ann Arbor, MI 48103. Attendance at this meeting is highly recommended.** Administrative and technical questions regarding this project will be answered at this time. The pre-proposal conference is for information only. Any answers furnished will not be official until verified in writing by the Financial Service Area, Procurement Unit. Answers that change or substantially clarify the proposal will be affirmed in an addendum.

D. PROPOSAL FORMAT

To be considered, each firm must submit a response to this RFP using the format provided in Section III. No other distribution of proposals is to be made by the prospective bidder. An official authorized to bind the bidder to its provisions must sign the proposal in ink. Each proposal must remain valid for at least one hundred and twenty (120) days from the due date of this RFP.

Proposals should be prepared simply and economically providing a straightforward, concise description of the bidder's ability to meet the requirements of the RFP. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal.

E. SELECTION CRITERIA

Responses to this RFP will be evaluated using a point system as shown in Section III. A selection committee comprised primarily of staff from the City will complete the evaluation.

If interviews are desired by the City, the selected firms will be given the opportunity to discuss their proposal, qualifications, past experience, and their fee proposal in more detail. The City further reserves the right to interview the key personnel assigned by the selected bidder to this project.

All proposals submitted may be subject to clarifications and further negotiation. All agreements resulting from negotiations that differ from what is represented within the RFP or in the proposal response shall be documented and included as part of the final contract.

F. SEALED PROPOSAL SUBMISSION

All proposals are due and must be delivered to the City on or before Thursday, July 7, 2022 by 2:00 p.m. (local time). Proposals submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

Each respondent should submit in a sealed envelope

- **one (1) original proposal**
- **one (1) additional proposal copy**
- **one (1) digital copy of the proposal preferably on a USB/flash drive as one file in PDF format**

Proposals submitted should be clearly marked: **"RFP No. 22-53 – Valve and Finished Water Tank & Reservoir Improvements"** and list the bidder's name and address.

Proposals must be addressed and delivered to:
City of Ann Arbor
c/o Customer Service
301 East Huron Street
Ann Arbor, MI 48107

All proposals received on or before the due date will be publicly opened and recorded on the due date. No immediate decisions will be rendered.

Hand delivered proposals may be dropped off in the Purchasing drop box located in the Ann Street (north) vestibule/entrance of City Hall which is accessible to the public at all hours. The City will not be liable to any prospective bidder for any unforeseen circumstances, delivery, or postal delays. Postmarking on the due date will not substitute for receipt of the proposal.

Bidders are responsible for submission of their proposal. Additional time will not be granted to a single prospective bidder. However, additional time may be granted to all prospective bidders at the discretion of the City.

A proposal may be disqualified if the following required forms are not included with the proposal:

- **Attachment D - Prevailing Wage Declaration of Compliance**
- **Attachment E - Living Wage Declaration of Compliance**
- **Attachment G - Vendor Conflict of Interest Disclosure Form**
- **Attachment H - Non-Discrimination Declaration of Compliance**

Proposals that fail to provide these forms listed above upon proposal opening may be deemed non-responsive and may not be considered for award.

G. DISCLOSURES

Under the Freedom of Information Act (Public Act 442), the City is obligated to permit review of its files, if requested by others. All information in a proposal is subject to disclosure under this provision. This act also provides for a complete disclosure of contracts and attachments thereto.

H. TYPE OF CONTRACT

A sample of the Construction Agreement is included as Attachment A. Those who wish to submit a proposal to the City are required to review this sample agreement carefully. **The City will not entertain changes to its Construction Agreement.**

For all construction work, the respondent must further adhere to the City of Ann Arbor General Conditions. The General Conditions are included herein. Retainage will be held as necessary based on individual tasks and not on the total contract value. The Contractor shall provide the required bonds included in the Contract Documents for a value of $50,000 for the duration of the Contract. The cost for these bonds shall be included in the fee schedule and paid for by the City quarterly. If the value of work at any time exceeds $50,000, the Contractor shall adjust the bonding amount appropriately.

The City reserves the right to award the total proposal, to reject any or all proposals in whole or in part, and to waive any informality or technical defects if, in the City's sole judgment, the best interests of the City will be so served.

This RFP and the selected bidder's response thereto, shall constitute the basis of the scope of services in the contract by reference.

I. NONDISCRIMINATION

All bidders proposing to do business with the City shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the Section 9:158 of the Ann Arbor City Code. Breach of the obligation not to discriminate as outlined in Attachment G shall be a material breach of the contract. Contractors are required to post a copy of Ann Arbor's Non-Discrimination Ordinance attached at all work locations where its employees provide services under a contract with the City.

J. WAGE REQUIREMENTS

The Attachments provided herein outline the requirements for payment of prevailing wages or of a "living wage" to employees providing service to the City under this contract. The successful bidder must comply with all applicable requirements and provide documentary proof of compliance when requested.

Pursuant to Resolution R-16-469 all public improvement contractors are subject to prevailing wage and will be required to provide to the City payroll records sufficient to demonstrate compliance with the prevailing wage requirements. Use of Michigan Department of Transportation Prevailing Wage Forms (sample attached hereto) or a City-approved equivalent will be required along with wage rate interviews.

For laborers whose wage level are subject to federal, state and/or local prevailing wage law the appropriate Davis-Bacon wage rate classification is identified based upon the work including within this contract. **The wage determination(s) current on the date 10 days before proposals are due shall apply to this contract.** The U.S. Department of Labor (DOL) has provided explanations to assist with classification in the following resource link: www.wdol.gov.

For the purposes of this RFP the Construction Type of Heavy will apply.

K. CONFLICT OF INTEREST DISCLOSURE

The City of Ann Arbor Purchasing Policy requires that the consultant complete a Conflict of Interest Disclosure form. A contract may not be awarded to the selected bidder unless and until the Procurement Unit and the City Administrator have reviewed the Disclosure form and determined that no conflict exists under applicable federal, state, or local law or administrative regulation. Not every relationship or situation disclosed on the Disclosure Form may be a disqualifying conflict. Depending on applicable law and regulations, some contracts may awarded on the recommendation of the City Administrator after full disclosure, where such action is allowed by law, if demonstrated competitive pricing exists and/or it is determined the award is in the best interest of the City. A copy of the Conflict of Interest Disclosure Form is attached.

L. COST LIABILITY

The City of Ann Arbor assumes no responsibility or liability for costs incurred by the bidder prior to the execution of a Professional Services Agreement. The liability of the City is limited to the terms and conditions outlined in the Agreement. By submitting a proposal, bidder agrees to bear all costs incurred or related to the preparation, submission, and selection process for the proposal.

M. DEBARMENT

Submission of a proposal in response to this RFP is certification that the Respondent is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal departments or agency. Submission is also agreement that the City will be notified of any changes in this status.

N. PROPOSAL PROTEST

All proposal protests must be in writing and filed with the Purchasing Manager within five (5) business days of the award action. The bidder must clearly state the reasons for the protest. If any bidder contacts a City Service Area/Unit and indicates a desire to protest an award, the Service Area/Unit shall refer the bidder to the Purchasing Manager. The Purchasing Manager will provide the bidder with the appropriate instructions for filing the protest. The protest shall be reviewed by the City Administrator or designee, whose decision shall be final.

Any inquiries or requests regarding this procurement should be only submitted in writing to the Designated City Contacts provided herein. Attempts by the bidder to initiate contact with anyone other than the Designated City Contacts provided herein that the bidder believes can influence the procurement decision, e.g., Elected Officials, City Administrator, Selection Committee Members, Appointed Committee Members, etc., may lead to immediate elimination from further consideration.

O. SCHEDULE

The following is the schedule for this RFP process.

Activity/Event	Anticipated Date
Written Question Deadline	June 14, 2022, 3:00 p.m. (local time)
Addenda Published (if needed)	Week of June 20, 2022
Proposal Due Date	July 7, 2022, 2:00 p.m. (local time)
Selection/Negotiations	July 2022
Expected City Council Authorizations	September 2022

The above schedule is for information purposes only and is subject to change at the City's discretion.

P. IRS FORM W-9

The selected bidder will be required to provide the City of Ann Arbor an IRS form W-9.

Q. RESERVATION OF RIGHTS

1. The City reserves the right in its sole and absolute discretion to accept or reject any or all proposals, or alternative proposals, in whole or in part, with or without cause.
2. The City reserves the right to waive, or not waive, informalities or irregularities in terms or conditions of any proposal if determined by the City to be in its best interest.
3. The City reserves the right to request additional information from any or all bidders.
4. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested within RFP.
5. The City reserves the right to determine whether the scope of the project will be entirely as described in the RFP, a portion of the scope, or a revised scope be implemented.
6. The City reserves the right to select one or more contractors or service providers to perform services.
7. The City reserves the right to retain all proposals submitted and to use any ideas in a proposal regardless of whether that proposal is selected. Submission of a proposal indicates acceptance by the firm of the conditions contained in this RFP, unless clearly and specifically noted in the proposal submitted.
8. The City reserves the right to disqualify proposals that fail to respond to any requirements outlined in the RFP, or failure to enclose copies of the required documents outlined within the RFP.

R. IDLEFREE ORDINANCE

The City of Ann Arbor adopted an idling reduction Ordinance that went into effect July 1, 2017. The full text of the ordinance (including exemptions) can be found at: www.a2gov.org/idlefree.

Under the ordinance, No Operator of a Commercial Vehicle shall cause or permit the Commercial Vehicle to Idle:

(a) For any period of time while the Commercial Vehicle is unoccupied; or

(b) For more than 5 minutes in any 60-minute period while the Commercial Vehicle is occupied.

In addition, generators and other internal combustion engines are covered

(1) Excluding Motor Vehicle engines, no internal combustion engine shall be operated except when it is providing power or electrical energy to equipment or a tool that is actively in use.

S. ENVIRONMENTAL COMMITMENT

The City of Ann Arbor recognizes its responsibility to minimize negative impacts on human health and the environment while supporting a vibrant community and economy. The City further recognizes that the products and services the City buys have inherent environmental and economic impacts and that the City should make procurement decisions that embody, promote, and encourage the City's commitment to the environment.

The City encourages potential vendors to bring forward emerging and progressive products and services that are best suited to the City's environmental principles.

T. BID SECURITY

Each bid must be accompanied by a certified check, or Bid Bond by a surety licensed and authorized to do business within the State of Michigan, in the amount of 5% of the total of the bid price.

U. MAJOR SUBCONTRACTORS

The Bidder shall identify each major subcontractor it expects to engage for this Contract if the work to be subcontracted is 15% or more of the bid sum or over $50,000, whichever is less. The Bidder also shall identify the work to be subcontracted to each major subcontractor. The Bidder shall not change or replace a subcontractor without approval by the City.

V. LIQUIDATED DAMAGES

A liquidated damages clause, as given on page C-2, Article III of the Contract, provides that the Contractor shall pay the City as liquidated damages, and not as a penalty, a sum certain per day for each and every day that the Contractor may be in default of completion of the specified work, within the time(s) stated in the Contract, or written extensions.

Liquidated damages clauses, as given in the General Conditions, provide further that the City shall be entitled to impose and recover liquidated damages for breach of the obligations under Chapter 112 of the City Code.

The liquidated damages are for the non-quantifiable aspects of any of the previously identified events and do not cover actual damages that can be shown or quantified nor are they intended to preclude recovery of actual damages in addition to the recovery of liquidated damages.

SECTION II - SCOPE OF SERVICES

Please see the drawings and detailed specifications for more details.

SECTION III - MINIMUM INFORMATION REQUIRED

PROPOSAL FORMAT

The following describes the elements that should be included in each of the proposal sections and the weighted point system that will be used for evaluation of the proposals.

Bidders should organize Proposals into the following Sections:

A. Qualifications, Experience and Accountability
B. Workplace Safety
C. Workforce Development
D. Social Equity and Sustainability
E. Schedule of Pricing/Cost
F. Authorized Negotiator
G. Attachments

Bidders are strongly encouraged to provided details for all of the information requested below within initial proposals. Backup documentation may be requested at the sole discretion of the City to validate all of the responses provided herein by bidders. False statements by bidders to any of the criteria provided herein will result in the proposal being considered non-responsive and will not be considered for award.

Pursuant to Sec 1:314(9) of the City Code which sets forth requirements for evaluating construction bids, Bidders should submit the following:

A. Qualifications, Experience and Accountability - 20 Points

1. Qualifications and experience of the bidder and of key persons, management, and supervisory personnel to be assigned by the bidder.

2. References from individuals or entities the bidder has worked for within the last five (5) years including information regarding records of performance and job site cooperation.

3. Evidence of any quality assurance program used by the bidder and the results of any such program on the bidder's previous projects.

4. A statement from the bidder as to any major subcontractors it expects to engage including the name, work, and amount.

B. Workplace Safety – 20 Points

1. Documentation of an on-going, Michigan OSHA-approved safety-training program for employees to be used on the proposed job site.

2. Evidence of the bidder's worker's compensation Experience Modification Rating ("EMR"). Preference within this criterion will be given to an EMR of 1.0 or less based on a three-year average.

3. Evidence that all craft labor that will be employed by the bidder for the project has, or will have prior to project commencement, completed at least the OSHA 10-hour training course for safety established by the U.S. Department of Labor, Occupational Safety & Health Administration.

4. The safety record of bidder and major subcontractors, including OSHA, MIOSHA, or other safety violations.

C. Workforce Development – 20 Points

1. The ratio of masters or journeypersons to apprentices proposed to be used on the construction project job site, if apprentices are to be used on the project.

2. Documentation as to bidder's pay rates, health insurance, pension or other retirement benefits, paid leave, or other fringe benefits to its employees.

3. Documentation that the bidder participates in a Registered Apprenticeship Program that is registered with the United States Department of Labor Office of Apprenticeship or by a State Apprenticeship Agency recognized by the USDOL Office of Apprenticeship.

D. Social Equity and Sustainability – 20 Points

1. A statement from the bidder as to what percentage of its workforce resides in the City of Ann Arbor and in Washtenaw County, Michigan. The City will consider in evaluating which bids best serve its interests, the extent to which responsible and qualified bidders are able to achieve this goal.

2. Evidence of Equal Employment Opportunity Programs for minorities, women, veterans, returning citizens, and small businesses.

3. Evidence that the bidder is an equal opportunity employer and does not discriminate on the basis of race, sex, pregnancy, age, religion, national origin,

marital status, sexual orientation, gender identity or expression, height, weight, or disability.

4. The bidder's proposed use of sustainable products, technologies, or practices for the project, which reduce the impact on human health and the environment, including raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and waste management.

5. The bidder's environmental record, including findings of violations and penalties imposed by government agencies.

BID FORM

E. Schedule of Pricing/Cost – 20 Points

Company: _____

Bid Items

Notes:

1. All five (5) Base Bid sections shall be bid. Bidders shall provide a Unit Price for ALL bid items for each Base Bid section and Total Price for ALL Base Bid sections specified.
2. Bidder shall provide prices or acknowledge "No Bid" for all Alternate Bid items specified.
3. Quantities included in the bid tables represent estimated quantities for different work. The Contractor shall be compensated for the actual number of items completed using the unit prices provided.
4. Each item shall include all preparatory and post repair work, including but not limited to field measurements, shop drawings, scaffolding, demolition, dust control, protection of Owner equipment, protection of process water, clean up, restoration, and all related items.
5. The City, at its sole discretion, may elect to delete any portion of the work delineated below, with no change to the unit prices provided. Work shall be determined based upon the availability of funds.
6. Any item not provided in the following list shall be considered incidental.
7. Contract shall be awarded based on the Base Bid or any combination of a Base Bid(s) and Alternate Bid(s) in any manner the City believes to be in its best interest.

Schedule

1. The Bidder agrees that the Work will be substantially and fully completed on or before the dates specified under Article III of the Contract, Time of Completion. Anticipated Notice to Proceed is September 2022.
2. Any exceptions to this schedule can proposed by the prospective bidder in Section 3 – Time Alternate.

Base Bids

For the entire work outlined in these documents for Valve and Finished Water Tank & Reservoir Improvements, complete as specified, using equipment and materials only of the type and manufacturers where specifically named.

BASE BID #1 – Water Treatment Plant – River Valve Replacement and Reservoir Improvements (Lump Sum)
Location: 919 Sunset Road, Ann Arbor, MI 48103

	Description	Units	Quantity	Unit Cost	Extended Cost
1.0	GENERAL				
1.1	General Conditions (Max 10%)	LS	1		$
1.2	Mobilization (Max 10%)	LS	1		$
1.3	Certified Payroll Compliance and Reporting	LS	1		$
1.4	Permit Allowance	ALW	1		$ 7,500
1.5	Miscellaneous Repair Allowance	ALW	1		$ 25,000
1.6	Concrete Repair Allowance	ALW	1		$ 50,000

BID FORM

BASE BID #1 – Water Treatment Plant – River Valve Replacement and Reservoir Improvements (Lump Sum)
Location: 919 Sunset Road, Ann Arbor, MI 48103

	Description	Units	Quantity	Unit Cost	Extended Cost
1.7	Coating Inspection Services Allowance	ALW	1		$ 5,000
1.8	Tank Inspection Services Allowance	ALW	1		$ 10,000
2.0	RIVER VALVE REPLACEMENT				
2.1	Replace 30” Valve, Adjacent Piping and Supports	LS	1	$	$
2.2	Salvage and Replace Existing Grating	LS	1	$	$
2.3	Replace Existing Hangers and Supports	LS	1	$	$
3.0	RESERVOIR VALVE VAULT IMPROVEMENTS				
3.1	Replace Reservoir Valves and Adjacent Piping	LS	1	$	$
3.2	Vault Structure Improvements	LS	1	$	$
3.3	Vault House Grating Replacement	LS	1	$	$
4.0	FILTER EFFLUENT PIPING IMPROVEMENTS				
4.1	Filter Effluent Piping Spot Repair	LS	1	$	$
4.2	Filter Effluent Piping Pipe Repair Wrap	LS	1	$	$
4.3	Filter Effluent Piping Support Replacement	LS	1	$	$
4.4	Filter Effluent Piping Coating Replacement	LS	1	$	$
5.0	RESERVOIR IMPROVEMENTS				
5.1	Replace Air Vent Screens	EA	6	$	$
5.2	Modify Existing Reservoir Access Hatch #1	LS	1	$	$
5.3	Modify Existing Reservoir Access Hatch #2	LS	1	$	$
5.4	Patch Concrete Spalls on Reservoir Ceiling, Shallow	EA	100	$	$
5.5	Coat Rebar and Patch Concrete Spalls on Reservoir Ceiling, Deep	EA	100	$	$
5.6	Patch Concrete Spalls on Reservoir Walls, Shallow	EA	100	$	$
5.7	Coat Rebar and Patch Concrete Spalls on Reservoir Walls, Deep	EA	100	$	$
5.8	Re-Coat All Wet Interior Piping and Appurtenances	LS	1	$	$
5.9	Modify Existing Overflow Piping	LS	1	$	$
5.10	Fire Hydrant	LS	1	$	$
5.11	Site Restoration	LS	1	$	$
BASE BID #1 TOTAL				$	
Alternate #1 – Vault #2 Structure Improvements (Add)				$	
Alternate #2 – Remove Valve FW 6317 Replacement (Deduct)				$	

BID FORM

BASE BID #2 – North Campus – Reservoir Improvements (Lump Sum) Location: 1800 Beal Avenue, Ann Arbor, MI 48105					
	Description	Units	Quantity	Unit Cost	Extended Cost
1.0	GENERAL				
1.1	General Conditions (Max 10%)	LS	1		$
1.2	Mobilization (Max 10%)	LS	1		$
1.3	Certified Payroll Compliance and Reporting	LS	1		$
1.4	Permit Allowance	ALW	1		$ 2 ,500
1.5	Miscellaneous Repair Allowance	ALW	1		$ 10,000
1.6	Concrete Repair Allowance	ALW	1		$ 10,000
1.7	Tank Inspection Services Allowance	ALW	1		$ 5,000
2.0	RESERVOIR IMPROVEMENTS				
2.1	Modify Existing Reservoir Access Hatch #1	LS	1	$	$
2.2	Modify Existing Reservoir Access Hatch #2	LS	1	$	$
2.3	Re-Coat All Wet Interior Piping and Appurtenances	LS	1	$	$
2.4	Modify Existing Overflow Piping	LS	1	$	$
2.5	Site Restoration	LS	1	$	$
BASE BID #2 TOTAL				$	
Alternate #3 – Relocate Existing Reservoir Access Hatch #1 (Add)				$	

BASE BID #3 – Liberty – Reservoir Improvements (Lump Sum)
Location: 2675 West Liberty Road, Ann Arbor, MI 48103

	Description	Units	Quantity	Unit Cost	Extended Cost
1.0	GENERAL				
1.1	General Conditions (Max 10%)	LS	1		$
1.2	Mobilization (Max 10%)	LS	1		$
1.3	Certified Payroll Compliance and Reporting	LS	1		$
1.4	Permit Allowance	ALW	1		$ 2,500
1.5	Miscellaneous Repair Allowance	ALW	1		$ 10,000
1.6	Concrete Repair Allowance	ALW	1		$ 10,000
1.7	Tank Inspection Services Allowance	ALW	1		$ 5,000
2.0	RESERVOIR IMPROVEMENTS				
2.1	Modify Existing Overflow Piping	LS	1	$	$
2.2	Modify Existing Reservoir Access Hatch #1	LS	1	$	$
2.3	Modify Existing Reservoir Access Hatch #2	LS	1	$	$
2.4	Re-Coat All Wet Interior Piping and Appurtenances	LS	1	$	$
2.5	Coat Rebar and Patch Concrete Spalls on Reservoir Walls, Shallow	EA	5	$	$
2.6	Site Restoration	LS	1	$	$
BASE BID #3 TOTAL				$	

BID FORM

BASE BID #4 – Manchester – Elevated Tank Improvements (Lump Sum)
Location: 2011 Manchester Road, Ann Arbor, MI 48104

	Description	Units	Quantity	Unit Cost	Extended Cost
1.0	GENERAL				
1.1	General Conditions (Max 10%)	LS	1		$
1.2	Mobilization (Max 10%)	LS	1		$
1.3	Certified Payroll Compliance and Reporting	LS	1		$
1.4	Permit Allowance	ALW	1		$ 2,500
1.5	Miscellaneous Repair Allowance	ALW	1		$ 5,000
1.6	Tank Inspection Services Allowance	ALW	1		$ 5,000
2.0	TANK IMPROVEMENTS				
2.1	Install 2-1/2” Check Valve on Condensate Drain	LS	1	$	$
2.2	Replace Gasket on Access Tube Roof Hatch	LS	1	$	$
2.3	Replace Existing Screen on 8” Overflow Pipe	LS	1	$	$
BASE BID #4 TOTAL				$	
Alternate #4 – Replace Wet Interior Roof Hatch (Add)				$	
Alternate #5 – Install Cathodic Protection in Wet Interior (Add)				$	
Alternate #6 – Install Fall Protection Device on Wet Interior Ladder (Add)				$	

BASE BID #5 – North Campus – Elevated Tank Improvements (Lump Sum)
Location: 3150 Plymouth Road, Ann Arbor, MI 48105

	Description	Units	Quantity	Unit Cost	Extended Cost
1.0	GENERAL				
1.1	General Conditions (Max 10%)	LS	1		$
1.2	Mobilization (Max 10%)	LS	1		$
1.3	Certified Payroll Compliance and Reporting	LS	1		$
1.4	Permit Allowance	ALW	1		$ 2,500
1.5	Miscellaneous Repair Allowance	ALW	1		$ 5,000
1.6	Tank Inspection Services Allowance	ALW	1		$ 5,000
2.0	TANK IMPROVEMENTS				
2.1	Dry Interior Maintenance Painting	LS	1	$	$
2.2	Replace Missing Fill Pipe Insulation and Frost Jacket	LS	1	$	$
2.3	Re-Coat Valve Pit Piping and Appurtenances	LS	1	$	$
2.4	Replace Gasket on Wet Interior Roof Hatch	LS	1	$	$
2.5	Replace Existing Screen on 8” Overflow Pipe	LS	1	$	$

BID FORM

BASE BID #5 – North Campus – Elevated Tank Improvements (Lump Sum)
Location: 3150 Plymouth Road, Ann Arbor, MI 48105

	Description	Units	Quantity	Unit Cost	Extended Cost
BASE BID #5 TOTAL				$	
Alternate #7 – Spot Coat Wet Interior Roof (Add)				$	

Signature of Authorized Representative of Bidder _____Date _____

BID FORM

MATERIAL, EQUIPMENT AND ENVIRONMENTAL ALTERNATES

The Base Bid proposal price shall include materials and equipment selected from the designated items and manufacturers listed in the bidding documents. This is done to establish uniformity in bidding and to establish standards of quality for the items named.

If the Contractor wishes to quote alternate items for consideration by the City, it may do so under this Section. A complete description of the item and the proposed price differential must be provided. Unless approved at the time of award, substitutions where items are specifically named will be considered only as a negotiated change in Contract Sum.

If an environmental alternative is bid the City strongly encourages bidders to provide recent examples of product testing and previous successful use for the City to properly evaluate the environmental alternative. Testing data from independent accredited organizations are strongly preferred.

Item Number	Description	Add/Deduct Amount

If the Bidder does not suggest any material or equipment alternate, the Bidder **MUST** complete the following statement:

For the work outlined in this request for bid, the bidder does NOT propose any material or equipment alternate under the Contract.

Signature of Authorized Representative of Bidder _____ Date _____

BID FORM

TIME ALTERNATE

If the Bidder takes exception to the time stipulated in Article III of the Contract, Time of Completion, page C-1, it is requested to stipulate below its proposed time for performance of the work. Consideration will be given to time in evaluating bids.

If the Bidder does not suggest any time alternate, the Bidder **MUST** complete the following statement:

For the work outlined in this request for bid, the bidder does NOT propose any time alternate under the Contract.

Signature of Authorized Representative of Bidder _____Date _____

BID FORM

MAJOR SUBCONTRACTORS

For purposes of this Contract, a Subcontractor is anyone (other than the Contractor) who performs work (other than or in addition to the furnishing of materials, plans or equipment) at or about the construction site, directly or indirectly for or on behalf of the Contractor (and whether or not in privity of Contract with the Contractor), but shall not include any individual who furnishes merely the individual's own personal labor or services.

Contractor agrees that all subcontracts entered into by the Contractor shall contain similar wage provision to Section 4 of the General Conditions covering subcontractor's employees who perform work on this contract.

For the work outlined in these documents the Bidder expects to engage the following major subcontractors to perform the work identified:

Subcontractor (Name and Address)	Work	Amount
	Concrete Contractor	
	Painting Contractor	
	Excavation Contractor	

If the Bidder does not expect to engage any major subcontractor, the Bidder **MUST** complete the following statement:

For the work outlined in this request for bid, the bidder does NOT expect to engage any major subcontractor to perform work under the Contract.

Signature of Authorized Representative of Bidder_____ Date _____

BID FORM

REFERENCES

GENERAL CONTRACTOR (if applicable) Name: _____

Include a minimum of three (3) references from similar projects involving building construction at similar facilities completed within the last seven (7) years.

1) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

2) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

3) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

BID FORM

REFERENCES

CONCRETE CONTRACTOR Name: _____

Include a minimum of three (3) references from similar projects involving roofing replacement at similar facilities completed within the last seven (7) years.

1) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

2) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

3) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

BID FORM

REFERENCES

PAINTING CONTRACTOR Name: _____

Include a minimum of three (3) references from similar projects involving masonry repairs at similar facilities completed within the last seven (7) years.

1) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

2) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

3) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

BID FORM

REFERENCES

EXCAVATION CONTRACTOR Name: _____

Include a minimum of three (3) references from similar projects involving interior finishes at similar facilities completed within the last seven (7) years.

1) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

2) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

3) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

F. AUTHORIZED NEGOTIATOR / NEGOTIATIBLE ELEMENTS (ALTERNATES)

Include the name, phone number, and e-mail address of persons(s) in your organization authorized to negotiate the agreement with the City.

The proposal price shall include materials and equipment selected from the designated items and manufacturers listed in the bidding documents. This is done to establish uniformity in bidding and to establish standards of quality for the items named.

If the bidder wishes to quote alternate items for consideration by the City, it may do so under this Section. A complete description of the item and the proposed price differential must be provided. Unless approved at the time of award, substitutions where items are specifically named will be considered only as a negotiated change in Contract Sum.

If the Bidder takes exception to the time stipulated in Article III of the Contract, Time of Completion, page C-2, it is requested to stipulate its proposed time for performance of the work.

Consideration for any proposed alternative items or time may be negotiated at the discretion of the City.

G. ATTACHMENTS

General Declaration, Legal Status of Bidder, Conflict of Interest Form, Living Wage Compliance Form, Prevailing Wage Compliance Form and the Non-Discrimination Form should be completed and returned with the proposal. These elements should be included as attachments to the proposal submission.

PROPOSAL EVALUATION

1. The selection committee will evaluate each proposal by the above-described criteria and point system. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested for evaluation. A proposal with all the requested information does not guarantee the proposing firm to be a candidate for an interview if interviews are selected to be held by the City. The committee may contact references to verify material submitted by the bidder.

2. The committee then will schedule interviews with the selected firms if necessary. The selected firms will be given the opportunity to discuss in more detail their qualifications, past experience, proposed work plan (if applicable) and pricing.

3. The interview should include the project team members expected to work on the project, but no more than six members total. The interview shall consist of a presentation of up to thirty minutes (or the length provided by the committee) by the

bidder, including the person who will be the project manager on this contract, followed by approximately thirty minutes of questions and answers. Audiovisual aids may be used during the oral interviews. The committee may record the oral interviews.

4. The firms interviewed will then be re-evaluated by the above criteria and adjustments to scoring will be made as appropriate. After evaluation of the proposals, further negotiation with the selected firm may be pursued leading to the award of a contract by City Council, if suitable proposals are received.

The City reserves the right to waive the interview process and evaluate the bidder based on their proposal and pricing schedules alone.

The City will determine whether the final scope of the project to be negotiated will be entirely as described in this RFP, a portion of the scope, or a revised scope.

Work to be done under this contract is generally described through the detailed specifications and must be completed fully in accordance with the contract documents.

Any proposal that does not conform fully to these instructions may be rejected.

PREPARATION OF PROPOSALS

Proposals should have no plastic bindings but will not be rejected as non-responsive for being bound. Staples or binder clips are acceptable. Proposals should be printed double sided on recycled paper.

Each person signing the proposal certifies that they are a person in the bidder's firm/organization responsible for the decisions regarding the fees being offered in the Proposal and has not and will not participate in any action contrary to the terms of this provision.

ADDENDA

If it becomes necessary to revise any part of the RFP, notice of the addendum will be posted to Michigan Inter-governmental Trade Network (MITN) www.mitn.info and/or the City of Ann Arbor web site www.A2gov.org for all parties to download.

Each bidder should acknowledge in its proposal all addenda it has received on the General Declarations form provided in the Attachments section herein. The failure of a bidder to receive or acknowledge receipt of any addenda shall not relieve the bidder of the responsibility for complying with the terms thereof. The City will not be bound by oral responses to inquiries or written responses other than official written addenda.

SECTION IV - ATTACHMENTS

Attachment A – Sample Standard Contract
- Sample Standard Contract
- Performance Bond
- Labor and Material Bond
- General Conditions
- Standard Specifications
- Detailed Specifications
- Appendix

Attachment B – General Declarations

Attachment C – Legal Status of Bidder

Attachment D – Prevailing Wage Declaration of Compliance Form

Attachment E – City of Ann Arbor Living Wage Declaration of Compliance Form

Attachment F – City of Ann Arbor Living Wage Ordinance

Attachment G – Vendor Conflict of Interest Disclosure Form

Attachment H – Declaration of Compliance Non-Discrimination Ordinance Form

Attachment I – City of Ann Arbor Non-Discrimination Ordinance

Sample Certified Payroll Report Template

ATTACHMENT A
SAMPLE STANDARD CONTRACT

If a contract is awarded, the selected contractor will be required to adhere to a set of general contract provisions which will become a part of any formal agreement. These provisions are general principles which apply to all contractors of service to the City of Ann Arbor such as the following:

Administrative Use Only
Contract Date: _____

CONTRACT

THIS CONTRACT is between the CITY OF ANN ARBOR, a Michigan Municipal Corporation, 301 East Huron Street, Ann Arbor, Michigan 48104 ("City") and _____ _____("Contractor")

_____

(An individual/partnership/corporation, include state of incorporation) (Address)

Based upon the mutual promises below, the Contractor and the City agree as follows:

ARTICLE I - Scope of Work

The Contractor agrees to furnish all of the materials, equipment and labor necessary; and to abide by all the duties and responsibilities applicable to it for the project titled **[Insert Title of Bid and Bid Number**] in accordance with the requirements and provisions of the following documents, including all written modifications incorporated into any of the documents, all of which are incorporated as part of this Contract:

Non-discrimination and Living Wage Declaration of Compliance Forms (if applicable)
Vendor Conflict of Interest Form
Prevailing Wage Declaration of Compliance Form (if applicable)
Bid Forms
Contract and Exhibits
Bonds
General Conditions
Standard Specifications
Detailed Specifications
Plans
Addenda

ARTICLE II - Definitions

Administering Service Area/Unit means **[Insert Name of Administering Service Unit]**

Project means **[Insert Title of Bid and Bid Number]**

Supervising Professional means the person acting under the authorization of the manager of the Administering Service Area/Unit. At the time this Contract is executed,

the Supervising Professional is: [**Insert the person's name**] whose job title is [**Insert job title**]. If there is any question concerning who the Supervising Professional is, Contractor shall confirm with the manager of the Administering Service Area/Unit.

Contractor's Representative means _____ [**Insert name**] whose job title is [**Insert job title**].

ARTICLE III - Time of Completion

(A) The work to be completed under this Contract shall begin immediately on the date specified in the Notice to Proceed issued by the City.

(B) The entire work for this Contract shall be completed within _____ ( ) consecutive calendar days.

(C) Failure to complete all the work within the time specified above, including any extension granted in writing by the Supervising Professional, shall obligate the Contractor to pay the City, as liquidated damages and not as a penalty, an amount equal to $_____ for each calendar day of delay in the completion of all the work. If any liquidated damages are unpaid by the Contractor, the City shall be entitled to deduct these unpaid liquidated damages from the monies due the Contractor.

The liquidated damages are for the non-quantifiable aspects of any of the previously identified events and do not cover actual damages that can be shown or quantified nor are they intended to preclude recovery of actual damages in addition to the recovery of liquidated damages.

ARTICLE IV - The Contract Sum

Choose one only.

(A) The City shall pay to the Contractor for the performance of the Contract, the lump sum price as given in the Bid Form in the amount of:

_____Dollars ($_____)

Or

(A) The City shall pay to the Contractor for the performance of the Contract, the unit prices as given in the Bid Form for the estimated bid total of:

_____Dollars ($_____)

(B) The amount paid shall be equitably adjusted to cover changes in the work ordered by the Supervising Professional but not required by the Contract Documents. Increases or decreases shall be determined only by written agreement between the City and Contractor.

ARTICLE V - Assignment

This Contract may not be assigned or subcontracted any portion of any right or obligation under this contract without the written consent of the City. Notwithstanding any consent by the City to any assignment, Contractor shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under this contract unless specifically released from the requirement, in writing, by the City.

ARTICLE VI - Choice of Law

This Contract shall be construed, governed, and enforced in accordance with the laws of the State of Michigan. By executing this Contract, the Contractor and the City agree to venue in a court of appropriate jurisdiction sitting within Washtenaw County for purposes of any action arising under this Contract. The parties stipulate that the venue referenced in this Contract is for convenience and waive any claim of non-convenience.

Whenever possible, each provision of the Contract will be interpreted in a manner as to be effective and valid under applicable law. The prohibition or invalidity, under applicable law, of any provision will not invalidate the remainder of the Contract.

ARTICLE VII - Relationship of the Parties

The parties of the Contract agree that it is not a Contract of employment but is a Contract to accomplish a specific result. Contractor is an independent Contractor performing services for the City. Nothing contained in this Contract shall be deemed to constitute any other relationship between the City and the Contractor.

Contractor certifies that it has no personal or financial interest in the project other than the compensation it is to receive under the Contract. Contractor certifies that it is not, and shall not become, overdue or in default to the City for any Contract, debt, or any other obligation to the City including real or personal property taxes. City shall have the right to set off any such debt against compensation awarded for services under this Contract.

ARTICLE VIII - Notice

All notices given under this Contract shall be in writing, and shall be by personal delivery or by certified mail with return receipt requested to the parties at their respective addresses as specified in the Contract Documents or other address the Contractor may specify in writing. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; or (2) three days after mailing certified U.S. mail.

ARTICLE IX - Indemnification

To the fullest extent permitted by law, Contractor shall indemnify, defend and hold the City, its officers, employees and agents harmless from all suits, claims, judgments and expenses including attorney's fees resulting or alleged to result, in whole or in part, from any act or omission, which is in any way connected or associated with this Contract, by the Contractor or anyone acting on the Contractor's behalf under this Contract. Contractor shall not be responsible to indemnify the City for losses or damages caused by or resulting from the City's sole negligence. The provisions of this Article shall survive the expiration or earlier termination of this contract for any reason.

ARTICLE X - Entire Agreement

This Contract represents the entire understanding between the City and the Contractor and it supersedes all prior representations, negotiations, agreements, or understandings whether written or oral. Neither party has relied on any prior representations in entering into this Contract. No terms or conditions of either party's invoice, purchase order or other administrative document shall modify the terms and conditions of this Contract, regardless of the other party's failure to object to such form. This Contract shall be binding on and shall inure to the benefit of the parties to this Contract and their permitted successors and permitted assigns and nothing in this Contract, express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Contract. This Contract may be altered, amended or modified only by written amendment signed by the City and the Contractor.

ARTICLE XI – Electronic Transactions

The City and Contractor agree that signatures on this Contract may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this Contract. This Contract may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

FOR CONTRACTOR

By_____

Its:_____

FOR THE CITY OF ANN ARBOR

By_____
Christopher Taylor, Mayor

By_____
Jacqueline Beaudry, City Clerk

Approved as to substance

By_____

City Administrator

By_____

Services Area Administrator

Approved as to form and content

_____
Stephen K. Postema, City Attorney

PERFORMANCE BOND

(1) _____ of _____(referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for $, the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.

(2) The Principal has entered a written Contract with the City entitled _____ _____ _____, for RFP No. _____and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq.

(3) Whenever the Principal is declared by the City to be in default under the Contract, the Surety may promptly remedy the default or shall promptly:

(a) complete the Contract in accordance with its terms and conditions; or

(b) obtain a bid or bids for submission to the City for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, arrange for a Contract between such bidder and the City, and make available, as work progresses, sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which Surety may be liable hereunder, the amount set forth in paragraph 1.

(4) Surety shall have no obligation to the City if the Principal fully and promptly performs under the Contract.

(5) Surety agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or the specifications accompanying it shall in any way affect its obligations on this bond, and waives notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work, or to the specifications.

(6) Principal, Surety, and the City agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this _____ day of _____, 202_.

_____	_____
(Name of Surety Company)	(Name of Principal)
By _____	By _____
(Signature)	(Signature)
Its_____	Its _____
(Title of Office)	(Title of Office)
Approved as to form:	Name and address of agent:
_____	_____
Stephen K. Postema, City Attorney	_____
	_____

LABOR AND MATERIAL BOND

(1) _____ of _____(referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan, (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for the use and benefit of claimants as defined in Act 213 of Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq., in the amount of $ _____, for the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.

(2) The Principal has entered a written Contract with the City entitled _____ _____ _____ ___, for RFP No. _____; and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963 as amended;

(3) If the Principal fails to promptly and fully repay claimants for labor and material reasonably required under the Contract, the Surety shall pay those claimants.

(4) Surety's obligations shall not exceed the amount stated in paragraph 1, and Surety shall have no obligation if the Principal promptly and fully pays the claimants.

(5) Principal, Surety, and the City agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this _____ day of _____, 202_

_____	_____
(Name of Surety Company)	(Name of Principal)
By _____	By _____
(Signature)	(Signature)
Its_____	Its _____
(Title of Office)	(Title of Office)
Approved as to form:	Name and address of agent:
_____	_____
Stephen K. Postema, City Attorney	_____
	_____

GENERAL CONDITIONS

Section 1 - Execution, Correlation and Intent of Documents

The contract documents shall be signed in 2 copies by the City and the Contractor.

The contract documents are complementary and what is called for by any one shall be binding. The intention of the documents is to include all labor and materials, equipment and transportation necessary for the proper execution of the work. Materials or work described in words which so applied have a well-known technical or trade meaning have the meaning of those recognized standards.

In case of a conflict among the contract documents listed below in any requirement(s), the requirement(s) of the document listed first shall prevail over any conflicting requirement(s) of a document listed later.

(1) Addenda in reverse chronological order; (2) Detailed Specifications; (3) Standard Specifications; (4) Plans; (5) General Conditions; (6) Contract; (7) Bid Forms; (8) Bond Forms; (9) Bid.

Section 2 - Order of Completion

The Contractor shall submit with each invoice, and at other times reasonably requested by the Supervising Professional, schedules showing the order in which the Contractor proposes to carry on the work. They shall include the dates at which the Contractor will start the several parts of the work, the estimated dates of completion of the several parts, and important milestones within the several parts.

Section 3 - Familiarity with Work

The Bidder or its representative shall make personal investigations of the site of the work and of existing structures and shall determine to its own satisfaction the conditions to be encountered, the nature of the ground, the difficulties involved, and all other factors affecting the work proposed under this Contract. The Bidder to whom this Contract is awarded will not be entitled to any additional compensation unless conditions are clearly different from those which could reasonably have been anticipated by a person making diligent and thorough investigation of the site.

The Bidder shall immediately notify the City upon discovery, and in every case prior to submitting its Bid, of every error or omission in the bidding documents that would be identified by a reasonably competent, diligent Bidder. In no case will a Bidder be allowed the benefit of extra compensation or time to complete the work under this Contract for extra expenses or time spent as a result of the error or omission.

Section 4 - Wage Requirements

Under this Contract, the Contractor shall conform to Chapter 14 of Title I of the Code of the City of Ann Arbor as amended; which in part states "...that all craftsmen, mechanics and laborers employed directly on the site in connection with said improvements, including said employees of

subcontractors, shall receive the prevailing wage for the corresponding classes of craftsmen, mechanics and laborers, as determined by statistics for the Ann Arbor area compiled by the United States Department of Labor. At the request of the City, any contractor or subcontractor shall provide satisfactory proof of compliance with the contract provisions required by the Section.

Pursuant to Resolution R-16-469 all public improvement contractors are subject to prevailing wage and will be required to provide to the City payroll records sufficient to demonstrate compliance with the prevailing wage requirements. A sample Prevailing Wage Form is provided in the appendix herein for reference as to what will be expected from contractors. Use of the Prevailing Wage Form provided in the appendix or a City-approved equivalent will be required along with wage rate interviews.

Where the Contract and the Ann Arbor City Ordinance are silent as to definitions of terms required in determining contract compliance with regard to prevailing wages, the definitions provided in the Davis-Bacon Act as amended (40 U.S.C. 278-a to 276-a-7) for the terms shall be used.

If the Contractor is a “covered employer” as defined in Chapter 23 of the Ann Arbor City Code, the Contractor agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. The Contractor agrees to pay those employees providing Services to the City under this Contract a “living wage,” as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3); to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Contract are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

Contractor agrees that all subcontracts entered into by the Contractor shall contain similar wage provision covering subcontractor’s employees who perform work on this contract.

Section 5 - Non-Discrimination

The Contractor agrees to comply, and to require its subcontractor(s) to comply, with the nondiscrimination provisions of MCL 37.2209. The Contractor further agrees to comply with the provisions of Section 9:158 of Chapter 112 of Title IX of the Ann Arbor City Code, and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity.

Section 6 - Materials, Appliances, Employees

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary or used for the execution and completion of the work. Unless otherwise specified, all materials incorporated in the permanent work shall be new, and both workmanship and materials shall be of the highest quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

The Contractor shall at all times enforce strict discipline and good order among its employees, and shall seek to avoid employing on the work any unfit person or anyone not skilled in the work assigned.

Adequate sanitary facilities shall be provided by the Contractor.

Section 7 - Qualifications for Employment

The Contractor shall employ competent laborers and mechanics for the work under this Contract. For work performed under this Contract, employment preference shall be given to qualified local residents.

Section 8 - Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringements of any patent rights and shall hold the City harmless from loss on account of infringement except that the City shall be responsible for all infringement loss when a particular process or the product of a particular manufacturer or manufacturers is specified, unless the City has notified the Contractor prior to the signing of the Contract that the particular process or product is patented or is believed to be patented.

Section 9 - Permits and Regulations

The Contractor must secure and pay for all permits, permit or plan review fees and licenses necessary for the prosecution of the work. These include but are not limited to City building permits, right-of-way permits, lane closure permits, right-of-way occupancy permits, and the like. The City shall secure and pay for easements shown on the plans unless otherwise specified.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the contract documents are at variance with those requirements, it shall promptly notify the Supervising Professional in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work.

Section 10 - Protection of the Public and of Work and Property

The Contractor is responsible for the means, methods, sequences, techniques and procedures of construction and safety programs associated with the work contemplated by this contract. The Contractor, its agents or sub-contractors, shall comply with the "General Rules and Regulations for the Construction Industry" as published by the Construction Safety Commission of the State of Michigan and to all other local, State and National laws, ordinances, rules and regulations pertaining to safety of persons and property.

The Contractor shall take all necessary and reasonable precautions to protect the safety of the public. It shall continuously maintain adequate protection of all work from damage, and shall take all necessary and reasonable precautions to adequately protect all public and private property from injury or loss arising in connection with this Contract. It shall make good any damage, injury or loss to its work and to public and private property resulting from lack of reasonable protective precautions, except as may be due to errors in the contract documents, or caused by agents or

employees of the City. The Contractor shall obtain and maintain sufficient insurance to cover damage to any City property at the site by any cause.

In an emergency affecting the safety of life, or the work, or of adjoining property, the Contractor is, without special instructions or authorization from the Supervising Professional, permitted to act at its discretion to prevent the threatened loss or injury. It shall also so act, without appeal, if authorized or instructed by the Supervising Professional.

Any compensation claimed by the Contractor for emergency work shall be determined by agreement or in accordance with the terms of Claims for Extra Cost - Section 15.

Section 11 - Inspection of Work

The City shall provide sufficient competent personnel for the inspection of the work.

The Supervising Professional shall at all times have access to the work whenever it is in preparation or progress, and the Contractor shall provide proper facilities for access and for inspection.

If the specifications, the Supervising Professional's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Supervising Professional timely notice of its readiness for inspection, and if the inspection is by an authority other than the Supervising Professional, of the date fixed for the inspection. Inspections by the Supervising Professional shall be made promptly, and where practicable at the source of supply. If any work should be covered up without approval or consent of the Supervising Professional, it must, if required by the Supervising Professional, be uncovered for examination and properly restored at the Contractor's expense.

Re-examination of any work may be ordered by the Supervising Professional, and, if so ordered, the work must be uncovered by the Contractor. If the work is found to be in accordance with the contract documents, the City shall pay the cost of re-examination and replacement. If the work is not in accordance with the contract documents, the Contractor shall pay the cost.

Section 12 - Superintendence

The Contractor shall keep on the work site, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Supervising Professional. The superintendent will be responsible to perform all on-site project management for the Contractor. The superintendent shall be experienced in the work required for this Contract. The superintendent shall represent the Contractor and all direction given to the superintendent shall be binding as if given to the Contractor. Important directions shall immediately be confirmed in writing to the Contractor. Other directions will be confirmed on written request. The Contractor shall give efficient superintendence to the work, using its best skill and attention.

Section 13 - Changes in the Work

The City may make changes to the quantities of work within the general scope of the Contract at any time by a written order and without notice to the sureties. If the changes add to or deduct from the extent of the work, the Contract Sum shall be adjusted accordingly. All the changes shall be

executed under the conditions of the original Contract except that any claim for extension of time caused by the change shall be adjusted at the time of ordering the change.

In giving instructions, the Supervising Professional shall have authority to make minor changes in the work not involving extra cost and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Supervising Professional, and no claim for an addition to the Contract Sum shall be valid unless the additional work was ordered in writing.

The Contractor shall proceed with the work as changed and the value of the work shall be determined as provided in Claims for Extra Cost - Section 15.

Section 14 - Extension of Time

Extension of time stipulated in the Contract for completion of the work will be made if and as the Supervising Professional may deem proper under any of the following circumstances:

(1) When work under an extra work order is added to the work under this Contract;

(2) When the work is suspended as provided in Section 20;

(3) When the work of the Contractor is delayed on account of conditions which could not have been foreseen, or which were beyond the control of the Contractor, and which were not the result of its fault or negligence;

(4) Delays in the progress of the work caused by any act or neglect of the City or of its employees or by other Contractors employed by the City;

(5) Delay due to an act of Government;

(6) Delay by the Supervising Professional in the furnishing of plans and necessary information;

(7) Other cause which in the opinion of the Supervising Professional entitles the Contractor to an extension of time.

The Contractor shall notify the Supervising Professional within 7 days of an occurrence or conditions which, in the Contractor's opinion, entitle it to an extension of time. The notice shall be in writing and submitted in ample time to permit full investigation and evaluation of the Contractor's claim. The Supervising Professional shall acknowledge receipt of the Contractor's notice within 7 days of its receipt. Failure to timely provide the written notice shall constitute a waiver by the Contractor of any claim.

In situations where an extension of time in contract completion is appropriate under this or any other section of the contract, the Contractor understands and agrees that the only available adjustment for events that cause any delays in contract completion shall be extension of the required time for contract completion and that there shall be no adjustments in the money due the Contractor on account of the delay.

Section 15 - Claims for Extra Cost

If the Contractor claims that any instructions by drawings or other media issued after the date of the Contract involved extra cost under this Contract, it shall give the Supervising Professional written notice within 7 days after the receipt of the instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property. The procedure shall then be as provided for Changes in the Work-Section l3. No claim shall be valid unless so made.

If the Supervising Professional orders, in writing, the performance of any work not covered by the contract documents, and for which no item of work is provided in the Contract, and for which no unit price or lump sum basis can be agreed upon, then the extra work shall be done on a Cost-Plus-Percentage basis of payment as follows:

(1) The Contractor shall be reimbursed for all reasonable costs incurred in doing the work, and shall receive an additional payment of 15% of all the reasonable costs to cover both its indirect overhead costs and profit;

(2) The term "Cost" shall cover all payroll charges for employees and supervision required under the specific order, together with all worker's compensation, Social Security, pension and retirement allowances and social insurance, or other regular payroll charges on same; the cost of all material and supplies required of either temporary or permanent character; rental of all power-driven equipment at agreed upon rates, together with cost of fuel and supply charges for the equipment; and any costs incurred by the Contractor as a direct result of executing the order, if approved by the Supervising Professional;

(3) If the extra is performed under subcontract, the subcontractor shall be allowed to compute its charges as described above. The Contractor shall be permitted to add an additional charge of 5% percent to that of the subcontractor for the Contractor's supervision and contractual responsibility;

(4) The quantities and items of work done each day shall be submitted to the Supervising Professional in a satisfactory form on the succeeding day, and shall be approved by the Supervising Professional and the Contractor or adjusted at once;

(5) Payments of all charges for work under this Section in any one month shall be made along with normal progress payments. Retainage shall be in accordance with Progress Payments-Section 16.

No additional compensation will be provided for additional equipment, materials, personnel, overtime or special charges required to perform the work within the time requirements of the Contract.

When extra work is required and no suitable price for machinery and equipment can be determined in accordance with this Section, the hourly rate paid shall be 1/40 of the basic weekly rate listed in the Rental Rate Blue Book published by Dataquest Incorporated and applicable to the time period the equipment was first used for the extra work. The hourly rate will be deemed to include all costs of operation such as bucket or blade, fuel, maintenance, "regional factors", insurance, taxes, and the like, but not the costs of the operator.

Section 16 - Progress Payments

The Contractor shall submit each month, or at longer intervals, if it so desires, an invoice covering work performed for which it believes payment, under the Contract terms, is due. The submission shall be to the City's Finance Department - Accounting Division. The Supervising Professional will, within 10 days following submission of the invoice, prepare a certificate for payment for the work in an amount to be determined by the Supervising Professional as fairly representing the acceptable work performed during the period covered by the Contractor's invoice. To insure the proper performance of this Contract, the City will retain a percentage of the estimate in accordance with Act 524, Public Acts of 1980. The City will then, following the receipt of the Supervising Professional's Certificate, make payment to the Contractor as soon as feasible, which is anticipated will be within 15 days.

An allowance may be made in progress payments if substantial quantities of permanent material have been delivered to the site but not incorporated in the completed work if the Contractor, in the opinion of the Supervising Professional, is diligently pursuing the work under this Contract. Such materials shall be properly stored and adequately protected. Allowance in the estimate shall be at the invoice price value of the items. Notwithstanding any payment of any allowance, all risk of loss due to vandalism or any damages to the stored materials remains with the Contractor.

In the case of Contracts which include only the Furnishing and Delivering of Equipment, the payments shall be; 60% of the Contract Sum upon the delivery of all equipment to be furnished, or in the case of delivery of a usable portion of the equipment in advance of the total equipment delivery, 60% of the estimated value of the portion of the equipment may be paid upon its delivery in advance of the time of the remainder of the equipment to be furnished; 30% of the Contract Sum upon completion of erection of all equipment furnished, but not later than 60 days after the date of delivery of all of the equipment to be furnished; and payment of the final 10% on final completion of erection, testing and acceptance of all the equipment to be furnished; but not later than l80 days after the date of delivery of all of the equipment to be furnished, unless testing has been completed and shows the equipment to be unacceptable.

With each invoice for periodic payment, the Contractor shall enclose a Contractor's Declaration - Section 43, and an updated project schedule per Order of Completion - Section 2.

Section 17 - Deductions for Uncorrected Work

If the Supervising Professional decides it is inexpedient to correct work that has been damaged or that was not done in accordance with the Contract, an equitable deduction from the Contract price shall be made.

Section 18 - Correction of Work Before Final Payment

The Contractor shall promptly remove from the premises all materials condemned by the Supervising Professional as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute the work in accordance with the Contract and without expense to the City and shall bear the expense of making good all work of other contractors destroyed or damaged by the removal or replacement.

If the Contractor does not remove the condemned work and materials within l0 days after written notice, the City may remove them and, if the removed material has value, may store the material

at the expense of the Contractor. If the Contractor does not pay the expense of the removal within 10 days thereafter, the City may, upon 10 days written notice, sell the removed materials at auction or private sale and shall pay to the Contractor the net proceeds, after deducting all costs and expenses that should have been borne by the Contractor. If the removed material has no value, the Contractor must pay the City the expenses for disposal within 10 days of invoice for the disposal costs.

The inspection or lack of inspection of any material or work pertaining to this Contract shall not relieve the Contractor of its obligation to fulfill this Contract and defective work shall be made good. Unsuitable materials may be rejected by the Supervising Professional notwithstanding that the work and materials have been previously overlooked by the Supervising Professional and accepted or estimated for payment or paid for. If the work or any part shall be found defective at any time before the final acceptance of the whole work, the Contractor shall forthwith make good the defect in a manner satisfactory to the Supervising Professional. The judgment and the decision of the Supervising Professional as to whether the materials supplied and the work done under this Contract comply with the requirements of the Contract shall be conclusive and final.

Section 19 - Acceptance and Final Payment

Upon receipt of written notice that the work is ready for final inspection and acceptance, the Supervising Professional will promptly make the inspection. When the Supervising Professional finds the work acceptable under the Contract and the Contract fully performed, the Supervising Professional will promptly sign and issue a final certificate stating that the work required by this Contract has been completed and is accepted by the City under the terms and conditions of the Contract. The entire balance found to be due the Contractor, including the retained percentage, shall be paid to the Contractor by the City within 30 days after the date of the final certificate.

Before issuance of final certificates, the Contractor shall file with the City:

(1) The consent of the surety to payment of the final estimate;
(2) The Contractor's Affidavit in the form required by Section 44.

In case the Affidavit or consent is not furnished, the City may retain out of any amount due the Contractor, sums sufficient to cover all lienable claims.

The making and acceptance of the final payment shall constitute a waiver of all claims by the City except those arising from:

(1) unsettled liens;
(2) faulty work appearing within 12 months after final payment;
(3) hidden defects in meeting the requirements of the plans and specifications;
(4) manufacturer's guarantees.

It shall also constitute a waiver of all claims by the Contractor, except those previously made and still unsettled.

Section 20 - Suspension of Work

The City may at any time suspend the work, or any part by giving 5 days notice to the Contractor in writing. The work shall be resumed by the Contractor within 10 days after the date fixed in the

written notice from the City to the Contractor to do so. The City shall reimburse the Contractor for expense incurred by the Contractor in connection with the work under this Contract as a result of the suspension.

If the work, or any part, shall be stopped by the notice in writing, and if the City does not give notice in writing to the Contractor to resume work at a date within 90 days of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work suspended and will be entitled to the estimates and payments for all work done on the portions abandoned, if any, plus 10% of the value of the work abandoned, to compensate for loss of overhead, plant expense, and anticipated profit.

Section 21 - Delays and the City's Right to Terminate Contract

If the Contractor refuses or fails to prosecute the work, or any separate part of it, with the diligence required to insure completion, ready for operation, within the allowable number of consecutive calendar days specified plus extensions, or fails to complete the work within the required time, the City may, by written notice to the Contractor, terminate its right to proceed with the work or any part of the work as to which there has been delay. After providing the notice the City may take over the work and prosecute it to completion, by contract or otherwise, and the Contractor and its sureties shall be liable to the City for any excess cost to the City. If the Contractor's right to proceed is terminated, the City may take possession of and utilize in completing the work, any materials, appliances and plant as may be on the site of the work and useful for completing the work. The right of the Contractor to proceed shall not be terminated or the Contractor charged with liquidated damages where an extension of time is granted under Extension of Time - Section 14.

If the Contractor is adjudged a bankrupt, or if it makes a general assignment for the benefit of creditors, or if a receiver is appointed on account of its insolvency, or if it persistently or repeatedly refuses or fails except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or if it fails to make prompt payments to subcontractors or for material or labor, or persistently disregards laws, ordinances or the instructions of the Supervising Professional, or otherwise is guilty of a substantial violation of any provision of the Contract, then the City, upon the certificate of the Supervising Professional that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor 3 days written notice, terminate this Contract. The City may then take possession of the premises and of all materials, tools and appliances thereon and without prejudice to any other remedy it may have, make good the deficiencies or finish the work by whatever method it may deem expedient, and deduct the cost from the payment due the Contractor. The Contractor shall not be entitled to receive any further payment until the work is finished. If the expense of finishing the work, including compensation for additional managerial and administrative services exceeds the unpaid balance of the Contract Sum, the Contractor and its surety are liable to the City for any excess cost incurred. The expense incurred by the City, and the damage incurred through the Contractor's default, shall be certified by the Supervising Professional.

Section 22 - Contractor's Right to Terminate Contract

If the work should be stopped under an order of any court, or other public authority, for a period of 3 months, through no act or fault of the Contractor or of anyone employed by it, then the Contractor may, upon 7 days written notice to the City, terminate this Contract and recover from the City payment for all acceptable work executed plus reasonable profit.

Section 23 - City's Right To Do Work

If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the City, 3 days after giving written notice to the Contractor and its surety may, without prejudice to any other remedy the City may have, make good the deficiencies and may deduct the cost from the payment due to the Contractor.

Section 24 - Removal of Equipment and Supplies

In case of termination of this Contract before completion, from any or no cause, the Contractor, if notified to do so by the City, shall promptly remove any part or all of its equipment and supplies from the property of the City, failing which the City shall have the right to remove the equipment and supplies at the expense of the Contractor.

The removed equipment and supplies may be stored by the City and, if all costs of removal and storage are not paid by the Contractor within 10 days of invoicing, the City upon 10 days written notice may sell the equipment and supplies at auction or private sale, and shall pay the Contractor the net proceeds after deducting all costs and expenses that should have been borne by the Contractor and after deducting all amounts claimed due by any lien holder of the equipment or supplies.

Section 25 - Responsibility for Work and Warranties

The Contractor assumes full responsibility for any and all materials and equipment used in the construction of the work and may not make claims against the City for damages to materials and equipment from any cause except negligence or willful act of the City. Until its final acceptance, the Contractor shall be responsible for damage to or destruction of the project (except for any part covered by Partial Completion and Acceptance - Section 26). The Contractor shall make good all work damaged or destroyed before acceptance. All risk of loss remains with the Contractor until final acceptance of the work (Section 19) or partial acceptance (Section 26). The Contractor is advised to investigate obtaining its own builders risk insurance.

The Contractor shall guarantee the quality of the work for a period of one year. The Contractor shall also unconditionally guarantee the quality of all equipment and materials that are furnished and installed under the contract for a period of one year. At the end of one year after the Contractor's receipt of final payment, the complete work, including equipment and materials furnished and installed under the contract, shall be inspected by the Contractor and the Supervising Professional. Any defects shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. Any defects that are identified prior to the end of one year shall also be inspected by the Contractor and the Supervising Professional and shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. The Contractor shall assign all manufacturer or material supplier warranties to the City prior to final payment. The assignment shall not relieve the Contractor of its obligations under this paragraph to correct defects.

Section 26 - Partial Completion and Acceptance

If at any time prior to the issuance of the final certificate referred to in Acceptance and Final Payment - Section 19, any portion of the permanent construction has been satisfactorily completed, and if the Supervising Professional determines that portion of the permanent construction is not required for the operations of the Contractor but is needed by the City, the Supervising Professional shall issue to the Contractor a certificate of partial completion, and immediately the City may take over and use the portion of the permanent construction described in the certificate, and exclude the Contractor from that portion.

The issuance of a certificate of partial completion shall not constitute an extension of the Contractor's time to complete the portion of the permanent construction to which it relates if the Contractor has failed to complete it in accordance with the terms of this Contract. The issuance of the certificate shall not release the Contractor or its sureties from any obligations under this Contract including bonds.

If prior use increases the cost of, or delays the work, the Contractor shall be entitled to extra compensation, or extension of time, or both, as the Supervising Professional may determine.

Section 27 - Payments Withheld Prior to Final Acceptance of Work

The City may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any certificate to the extent reasonably appropriate to protect the City from loss on account of:

(1) Defective work not remedied;

(2) Claims filed or reasonable evidence indicating probable filing of claims by other parties against the Contractor;

(3) Failure of the Contractor to make payments properly to subcontractors or for material or labor;

(4) Damage to another Contractor.

When the above grounds are removed or the Contractor provides a Surety Bond satisfactory to the City which will protect the City in the amount withheld, payment shall be made for amounts withheld under this section.

Section 28 - Contractor's Insurance

(1) The Contractor shall procure and maintain during the life of this Contract, including the guarantee period and during any warranty work, such insurance policies, including those set forth below, as will protect itself and the City from all claims for bodily injuries, death or property damage that may arise under this Contract; whether the act(s) or omission(s) giving rise to the claim were made by the Contractor, any subcontractor, or anyone employed by them directly or indirectly. Prior to commencement of any work under this contract, Contractor shall provide to the City documentation satisfactory to the City, through City-approved means (currently myCOI), demonstrating it has obtained the required policies and endorsements. The certificates of insurance endorsements and/or copies of

policy language shall document that the Contractor satisfies the following minimum requirements. Contractor shall add registration@mycoitracking.com to its safe sender's list so that it will receive necessary communication from myCOI. When requested, Contractor shall provide the same documentation for its subcontractor(s) (if any).

Required insurance policies include:

(a) Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be obtained in the following minimum amounts:

Bodily Injury by Accident - $500,000 each accident
Bodily Injury by Disease - $500,000 each employee
Bodily Injury by Disease - $500,000 each policy limit

(b) Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 04 13 or current equivalent. The City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements specifically for the following coverages: Products and Completed Operations, Explosion, Collapse and Underground coverage or Pollution. Further there shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy. The following minimum limits of liability are required:

$1,000,000	Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined.
$2,000,000	Per Project General Aggregate
$1,000,000	Personal and Advertising Injury
$2,000,000	Products and Completed Operations Aggregate

(c) Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, equivalent to, as a minimum, Insurance Services Office form CA 00 01 10 13 or current equivalent. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. The City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy. Further, the limits of liability shall be $1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.

(d) Umbrella/Excess Liability Insurance shall be provided to apply excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of $1,000,000.

(2) Insurance required under subsection (1)(b) and (1)(c) above shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the City for any insurance listed herein.

(3) Insurance companies and policy forms are subject to approval of the City Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional and un-qualified 30-day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number(s); name of insurance company(s); name and address of the agent(s) or authorized representative(s); name(s), email address(es), and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which may be approved by the City, in its sole discretion; (c) that the policy conforms to the requirements specified Contractor shall furnish the City with satisfactory certificates of insurance and endorsements prior to commencement of any work. Upon request, the Contractor shall provide within 30 days a copy of the policy(ies) and all required endorsements to the City. If any of the above coverages expire by their terms during the term of this Contract, the Contractor shall deliver proof of renewal and/or new policies and endorsements to the Administering Service Area/Unit at least ten days prior to the expiration date.

(4) Any Insurance provider of Contractor shall be authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-authorized insurance companies are not acceptable unless approved in writing by the City.

(5) City reserves the right to require additional coverage and/or coverage amounts as may be included from time to time in the Detailed Specifications for the Project.

(6) The provisions of General Condition 28 shall survive the expiration or earlier termination of this contract for any reason.

Section 29 - Surety Bonds

Bonds will be required from the successful bidder as follows:

(1) A Performance Bond to the City of Ann Arbor for the amount of the bid(s) accepted;
(2) A Labor and Material Bond to the City of Ann Arbor for the amount of the bid(s) accepted.

Bonds shall be executed on forms supplied by the City in a manner and by a Surety Company authorized to transact business in Michigan and satisfactory to the City Attorney.

Section 30 - Damage Claims

The Contractor shall be held responsible for all damages to property of the City or others, caused by or resulting from the negligence of the Contractor, its employees, or agents during the progress of or connected with the prosecution of the work, whether within the limits of the work or elsewhere. The Contractor must restore all property injured including sidewalks, curbing, sodding, pipes, conduit, sewers or other public or private property to not less than its original condition with new work.

Section 31 - Refusal to Obey Instructions

If the Contractor refuses to obey the instructions of the Supervising Professional, the Supervising Professional shall withdraw inspection from the work, and no payments will be made for work performed thereafter nor may work be performed thereafter until the Supervising Professional shall have again authorized the work to proceed.

Section 32 - Assignment

Neither party to the Contract shall assign the Contract without the written consent of the other. The Contractor may assign any monies due to it to a third party acceptable to the City.

Section 33 - Rights of Various Interests

Whenever work being done by the City's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Supervising Professional, to secure the completion of the various portions of the work in general harmony.

The Contractor is responsible to coordinate all aspects of the work, including coordination of, and with, utility companies and other contractors whose work impacts this project.

Section 34 - Subcontracts

The Contractor shall not award any work to any subcontractor without prior written approval of the City. The approval will not be given until the Contractor submits to the City a written statement concerning the proposed award to the subcontractor. The statement shall contain all information the City may require.

The Contractor shall be as fully responsible to the City for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them, as it is for the acts and omissions of persons directly employed by it.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and all other contract documents applicable to the work of the subcontractors and to give the Contractor the same power to terminate any subcontract that the City may exercise over the Contractor under any provision of the contract documents.

Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the City.

Section 35 - Supervising Professional's Status

The Supervising Professional has the right to inspect any or all work. The Supervising Professional has authority to stop the work whenever stoppage may be appropriate to insure the proper execution of the Contract. The Supervising Professional has the authority to reject all work and materials which do not conform to the Contract and to decide questions which arise in the execution of the work.

The Supervising Professional shall make all measurements and determinations of quantities. Those measurements and determinations are final and conclusive between the parties.

Section 36 - Supervising Professional's Decisions

The Supervising Professional shall, within a reasonable time after their presentation to the Supervising Professional, make decisions in writing on all claims of the City or the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the contract documents.

Section 37 - Storing Materials and Supplies

Materials and supplies may be stored at the site of the work at locations agreeable to the City unless specific exception is listed elsewhere in these documents. Ample way for foot traffic and drainage must be provided, and gutters must, at all times, be kept free from obstruction. Traffic on streets shall be interfered with as little as possible. The Contractor may not enter or occupy with agents, employees, tools, or material any private property without first obtaining written permission from its owner. A copy of the permission shall be furnished to the Supervising Professional.

Section 38 - Lands for Work

The Contractor shall provide, at its own expense and without liability to the City, any additional land and access that may be required for temporary construction facilities or for storage of materials.

Section 39 - Cleaning Up

The Contractor shall, as directed by the Supervising Professional, remove at its own expense from the City's property and from all public and private property all temporary structures, rubbish and waste materials resulting from its operations unless otherwise specifically approved, in writing, by the Supervising Professional.

Section 40 - Salvage

The Supervising Professional may designate for salvage any materials from existing structures or underground services. Materials so designated remain City property and shall be transported or stored at a location as the Supervising Professional may direct.

Section 41 - Night, Saturday or Sunday Work

No night or Sunday work (without prior written City approval) will be permitted except in the case of an emergency and then only to the extent absolutely necessary. The City may allow night work which, in the opinion of the Supervising Professional, can be satisfactorily performed at night. Night work is any work between 8:00 p.m. and 7:00 a.m. No Saturday work will be permitted unless the Contractor gives the Supervising Professional at least 48 hours but not more than 5 days notice of the Contractor's intention to work the upcoming Saturday.

Section 42 - Sales Taxes

Under State law the City is exempt from the assessment of State Sales Tax on its direct purchases. Contractors who acquire materials, equipment, supplies, etc. for incorporation in City projects are not likewise exempt. State Law shall prevail. The Bidder shall familiarize itself with the State Law and prepare its Bid accordingly. No extra payment will be allowed under this Contract for failure of the Contractor to make proper allowance in this bid for taxes it must pay.

Section 43

CONTRACTOR'S DECLARATION

I hereby declare that I have not, during the period _____, 20___, to _____, 20 , performed any work, furnished any materials, sustained any loss, damage or delay, or otherwise done anything in addition to the regular items (or executed change orders) set forth in the Contract titled _____, for which I shall ask, demand, sue for, or claim compensation or extension of time from the City, except as I hereby make claim for additional compensation or extension of time as set forth on the attached itemized statement. I further declare that I have paid all payroll obligations related to this Contract that have become due during the above period and that all invoices related to this Contract received more than 30 days prior to this declaration have been paid in full except as listed below.

There is/is not (Contractor please circle one and strike one as appropriate) an itemized statement attached regarding a request for additional compensation or extension of time.

_____ _____
Contractor Date

By _____
(Signature)

Its _____
(Title of Office)

Past due invoices, if any, are listed below.

Section 44

CONTRACTOR'S AFFIDAVIT

The undersigned Contractor,_____, represents that on _____, 20___, it was awarded a contract by the City of Ann Arbor, Michigan to_____ under the terms and conditions of a Contract titled _____. The Contractor represents that all work has now been accomplished and the Contract is complete.

The Contractor warrants and certifies that all of its indebtedness arising by reason of the Contract has been fully paid or satisfactorily secured; and that all claims from subcontractors and others for labor and material used in accomplishing the project, as well as all other claims arising from the performance of the Contract, have been fully paid or satisfactorily settled. The Contractor agrees that, if any claim should hereafter arise, it shall assume responsibility for it immediately upon request to do so by the City of Ann Arbor.

The Contractor, for valuable consideration received, does further waive, release and relinquish any and all claims or right of lien which the Contractor now has or may acquire upon the subject premises for labor and material used in the project owned by the City of Ann Arbor.

This affidavit is freely and voluntarily given with full knowledge of the facts.

_____ _____
Contractor Date

By _____
(Signature)

Its _____
(Title of Office)

Subscribed and sworn to before me, on this _____ day of _____, 20__
_____ , _____ County, Michigan
Notary Public
_____ County, MI
My commission expires on:

STANDARD SPECIFICATIONS

All work under this contract shall be performed in accordance with the Public Services Department Standard Specifications in effect at the date of availability of the contract documents stipulated in the Bid. All work under this Contract which is not included in these Standard Specifications, or which is performed using modifications to these Standard Specifications, shall be performed in accordance with the Detailed Specifications included in these contract documents.

Standard Specifications are available online:

http://www.a2gov.org/departments/engineering/Pages/Engineering-and-Contractor-Resources.aspx

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Beginning of Geotechnical Data

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October 20, 2021
Project No. 211326

Fishbeck
2001 Commonwealth Boulevard, Suite 200
Ann Arbor, Michigan 48105

Attention: Mr. Joe Siwek, P.E.

Reference: Summary Letter of Geotechnical Investigation
Ann Arbor WTP Valve Replacement and Miscellaneous
Water Storage Improvements
Ann Arbor, Michigan

Dear Mr. Siwek:

We have completed a geotechnical investigation for the above-referenced project. The purpose of this investigation has been to identify the general subsurface soil conditions in the vicinity of the proposed construction. This work has been performed as described in the subconsultant agreement dated August 12, 2021.

Presented herein are descriptions the geotechnical investigation and encountered conditions. The Appendix contains the report limitations and data collected during this investigation.

PROJECT DESCRIPTION

Per discussions with Mr. Joe Siwek, P.E. of Fishbeck, we understand the construction will consist of valve replacements and miscellaneous water storage improvements within the area of investigation. The site is located at the Ann Arbor Water Treatment Plant at address 919 Sunset Road in Ann Arbor, Michigan. The area of investigation is shown in Figure No. 1.

INVESTIGATION METHODOLOGY

Hand auger borings and sampling along with field engineering reconnaissance were used to investigate the subsurface conditions. Boring locations, as chosen in consultation with Mr. Joe Siwek, P.E. of Fishbeck, are shown on Figure No. 1. Soil classification information and boring logs are provided in the Appendix.

Number of Borings	4
Boring Depth Range, ft.	5.5 to 10.0

Borings were drilled and other sampling was conducted solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.

Soil samples were reviewed by one of our engineers and technically classified according to the methods of ASTM D2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)".

INVESTIGATION RESULTS

Borings B-1 to B-4 generally encountered 10 to 12 inches of topsoil at the surface. Beneath the surficial materials, the borings generally encountered fill, consisting of brown clayey sand (SC) to the explored depths of 5.5 to 10.0 ft (els 990.2 to 994.2 ft). Boring B-1 encountered small pieces of asphalt from a depth of 2.6 to 3.0 ft (els 996.7 to 997.1 ft). Boring B-4 encountered layers of both brown clayey sand (SC) and brown poorly graded sand (SP) to the explored depth of 9.2 ft (el 990.2 ft). Auger refusal due to possible coarse gravel, cobble or concrete structures was noted in Borings B-1 and B-4 at depths of 5.5 to 9.2 (els 990.2 to 994.2 ft).

Groundwater was not encountered during our investigation. Groundwater levels may fluctuate due to seasonal variations such as precipitation, snowmelt, nearby river or lake levels and other factors that may not be evident at the time of measurement. Groundwater levels may be different at the time of construction.

This section has provided a generalized description of the encountered subsurface soil conditions. The boring logs located in the Appendix should be reviewed for detailed soil descriptions. Some variation in subsurface conditions may be expected between boring locations.

CLOSURE

In this report, descriptions of the geotechnical investigation and encountered conditions have been presented. The limitations of this study are described in the Appendix.

The samples may not fully indicate the nature and extent of the variations that actually exist between sampling locations. For that reason, among others, we strongly recommend that a qualified geotechnical firm be retained to observe earthwork construction. If variations or other latent conditions become evident during construction, we remain available to perform additional exploration or provide recommendations as appropriate.

We appreciate the opportunity to provide this service to you on this project. Should you have any questions or require further assistance, please contact our office.

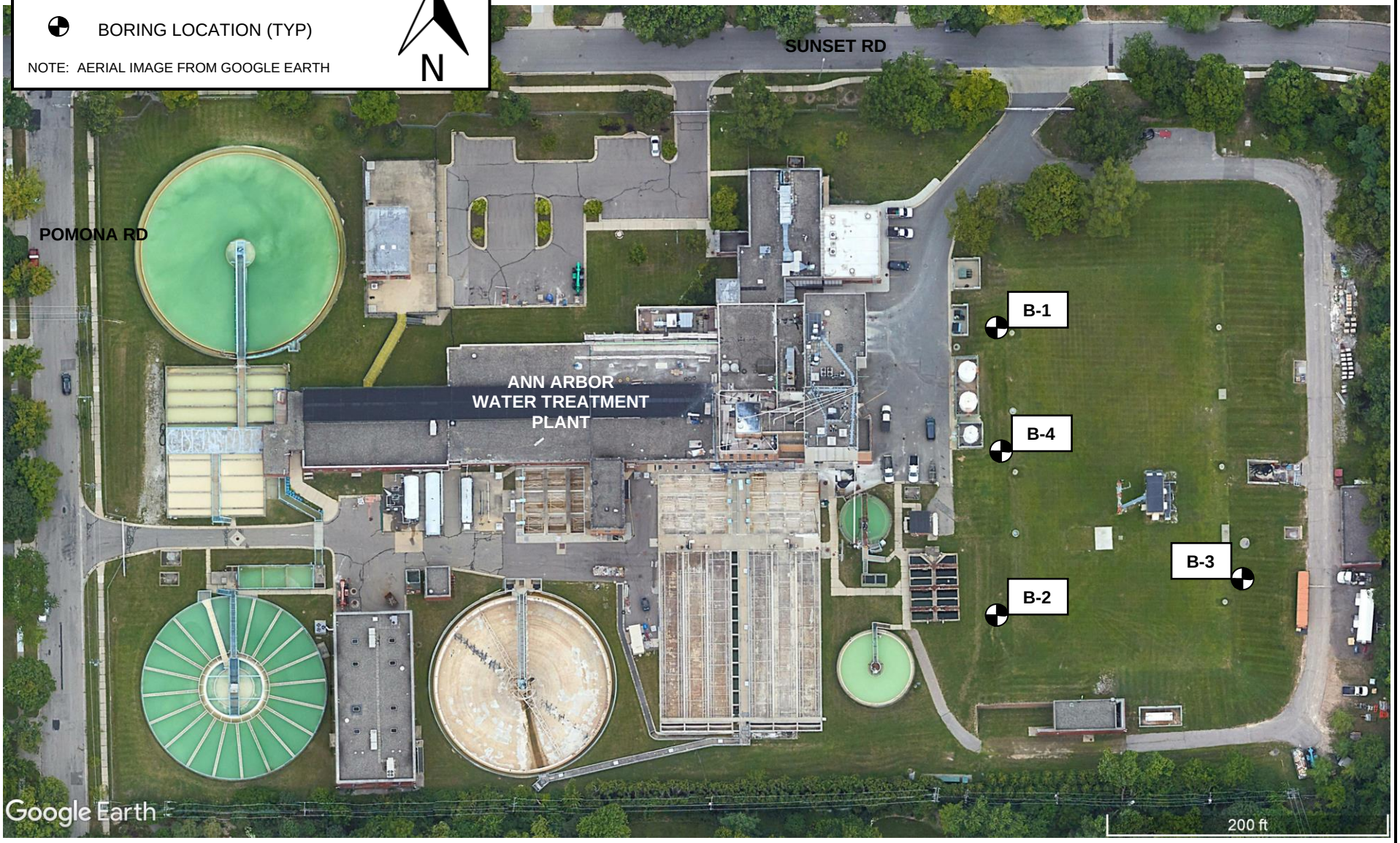
Sincerely,

MATERIALS TESTING CONSULTANTS, INC.

Ryan D. Starcher, E.I.T.
Project Engineer

Robert J. Warren, P.E.
Project Manager

Attachments: Figure No. 1 - Boring Location Plan
Appendix
- Limitations
- Boring Log Terminology and Classification Outline
- Boring Logs



TITLE: BORING LOCATION PLAN		PROJECT: ANN ARBOR WTP VALVE REPLACEMENT AND MISCELLANEOUS WATER STORAGE IMPROVEMENTS	
SCALE: NS	DATE: 10/12/2021	PROJECT NO.: 211326	MTC MATERIALS TESTING CONSULTANTS
FIG. NO.: 1	DR. BY: KLV	REV. BY: RW	

APPENDIX

- Limitations
- Boring Log Terminology and Classification Outline
- Boring Logs

LIMITATIONS

Soil Variations

The recommendations in this report are based upon the data obtained from the soil borings. This report does not reflect variations which may occur between these borings, and which would not become evident until construction. If variations then become evident, it would be necessary for a re-evaluation of recommendations of this report, after performing on-site observations.

Warranties

We have prepared this report in accordance with generally accepted soil and foundation engineering practices. We make no other warranties, either expressed or implied, as to the professional advice provided under the terms of our agreement and included in this report. This report is prepared exclusively for our client and may not be relied upon by other parties without written consent from our office.

Boring Logs

In the process of obtaining and testing samples and preparing this report, we follow reasonable and accepted practice in the field of soil engineering. Field logs maintained during drilling describe field occurrences, sampling locations, and other information. The samples obtained in the field are subjected to additional testing in the laboratory and differences may exist between the field logs and the final logs. The engineer reviews the field logs and laboratory test data, and then prepares the final boring logs. Our recommendations are based on the contents of the final logs.

Review of Design Plans and Specifications

In the event that any changes in the design of the building or the location, however slight, are planned, our recommendations shall not be considered valid unless modified or approved in writing by our office. We recommend that we be provided the opportunity to review the final design and specifications in order to determine whether changes in the original concept may have affected the validity of our recommendations, and whether our recommendations have, in fact, been implemented in the design and specifications.

BORING LOG TERMINOLOGY AND ASTM D 2488 CLASSIFICATION OUTLINE

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE-GRAINED SOILS (major portions retained on No. 200 sieve): includes (1) clean gravel and sands and (2) silty or clayey gravels and sands. Condition is rated according to relative density as determined by laboratory tests or standard penetration resistance tests.

Descriptive Terms	Relative Density	SPT Blow Count
Very loose	0 to 15 %	< 5
Loose	15 to 35 %	5 to 10
Medium dense	35 to 65 %	10 to 30
Dense	65 to 85 %	30 to 50
Very dense	85 to 100 %	> 50

Per ASTM D2487, the following conditions must be met based on laboratory testing to justify the label 'well graded' in a soil description.

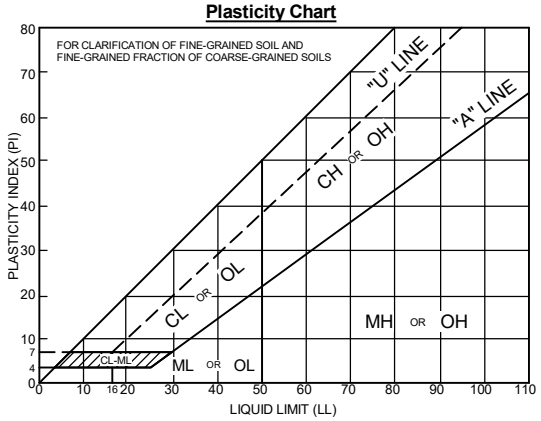
Gravel: $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3

Sand: $C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3

FINE-GRAINED SOILS (major portions passing on No. 200 sieve): includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings, SPT blow count, or unconfined compression tests.

Descriptive Terms	Unconfined Compressive Strength TSF	SPT Blow Count
Very soft	< 0.25	< 2
Soft	0.25 to 0.5	2 to 4
Medium stiff	0.5 to 1.0	4 to 8
Stiff	1.0 to 2.0	8 to 15
Very stiff	2.0 to 4.0	15 to 30
Hard	> 4.0	> 30

Plasticity Chart



MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LESS THAN 15% FINES	GW		WELL-GRADED GRAVELS WITH OR WITHOUT SAND
			GP		POORLY-GRADED GRAVELS WITH OR WITHOUT SAND
		GRAVELS WITH 15% OR MORE FINES	GM		SILTY GRAVELS WITH OR WITHOUT SAND
			GC		CLAYEY GRAVELS WITH OR WITHOUT SAND
	SANDS MORE THAN HALF COARSE FRACTION IS FINER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 15% FINES	SW		WELL-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP		POORLY-GRADED SANDS WITH OR WITHOUT GRAVEL
			SP-SM		POORLY-GRADED SANDS WITH SILT WITH OR WITHOUT GRAVEL
		SANDS WITH 15% OR MORE FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OL		ORGANIC SILTS OR CLAYS OF LOW TO MEDIUM PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			CH		INORGANIC CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
			OH		ORGANIC SILTS OR CLAYS OF HIGH PLASTICITY WITH OR WITHOUT SAND OR GRAVEL
HIGHLY ORGANIC SOILS			PT/OL		PEAT AND OTHER HIGHLY ORGANIC SOILS

GENERAL NOTES

1. Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.

2. "Grades with" or "Grades without" may be used to describe soil when characteristics vary within a stratum.

3. Preserved soil samples will be discarded after 60 days unless alternate arrangements have been made.

GROUNDWATER OBSERVATIONS:

During - indicates water level encountered during the boring
End- indicates water level immediately after drilling
Date and Depth - Measurements at indicated date

SAMPLE TYPES AND NUMBERING

	S	SPT, split barrel sample, ASTM D1586
	U	Shelby tube sample, ASTM D1587
	R	Rock core run
	*S	Other than 2" split barrel sample
	L	SPT with liner, ASTM D1586
	A	Auger cuttings
	G	Geoprobe liner

MINOR COMPONENT QUANTIFYING TERMS

Less than 5%	TRACE
5 to 10%	FEW
15 to 25%	LITTLE
30 to 40%	SOME
50 to 100%	MOSTLY

GRAIN SIZE

BOULDER	>12"
COBBLE	12" to 3"
COARSE GRAVEL	3" to 0.75"
FINE GRAVEL	0.75" to No. 4
COARSE SAND	No. 4 to No. 10
MEDIUM SAND	No. 10 to No.40
FINE SAND	No. 40 to No. 200

LOG OF BORING

Project No.: 211326
Boring No.: B-1
Sheet: 1 of 1

Project: Ann Arbor WTP Valve Replacement and Miscellaneous Water Storage Improvements
Client: Fishbeck
Location: Ann Arbor, Michigan
Drill Type: Hand Auger
Crew Chief: Field Eng.: JV Rev. By: RW
Coordinates: N=291021.3 E=13286948.3 (MI South ift)
Elevation: 999.7 ft Datum: NAVD 88 (GPS Observation)
Notes:

Plugging Record: Backfilled with excavated soil.

Date Begin: 10/07/2021 Date End: 10/07/2021

Tooling	Type	Dia.	Groundwater, ft.	
Casing	Hand Auger	3 1/4"	During	None
Sampler			End	NA
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer				

Depth Drilled: 5.5 ft.

Component Percentages: Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

QP = Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Dyn. Cone Eq. "N": ASTM STP 399	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	DD pcf	REMARKS
999.2	0.5					12" Topsoil				Fill: 0' to 5.5'
998.7	1.0					1.0				
998.2	1.5	A-1				Brown clayey SAND; mostly coarse to fine sand, little clayey fines, moist, Fill				
997.7	2.0									
997.2	2.5									
996.7	3.0									Small pieces of asphalt noted at 2.6' to 3.0'
996.2	3.5				SC					
995.7	4.0									
995.2	4.5	A-2				Grades with trace coarse to fine gravel at 3.7'				
994.7	5.0									
994.2	5.5	A-3				5.5				
						End of Boring				Auger refusal at 5.5' due to possible concrete structure, coarse gravel, or COBBLE

* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.

LOG OF BORING

Project No.: 211326
Boring No.: B-2
Sheet: 1 of 1

Project: Ann Arbor WTP Valve Replacement and Miscellaneous Water Storage Improvements
Client: Fishbeck
Location: Ann Arbor, Michigan
Drill Type: Hand Auger
Crew Chief: Field Eng.: JV Rev. By: RW
Coordinates: N=290816.9 E=13286959.4 (MI South ift)
Elevation: 1000.2 ft Datum: NAVD 88 (GPS Observation)
Notes:

Plugging Record: Backfilled with excavated soil.

Date Begin: 10/07/2021 Date End: 10/07/2021

Tooling	Type	Dia.	Groundwater, ft.	
Casing	Hand Auger	3 1/4"	During	None
Sampler			End	NA
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer				

Depth Drilled: 10.0 ft.

Component Percentages: Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

QP = Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Dyn. Cone Eq. "N": ASTM STP 399	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	DD pcf	REMARKS
999.7	0.5					10" Topsoil				Fill: 0' to 10.0'
999.2	1.0					0.8				
998.7	1.5	A-1			SC	Brown clayey SAND; mostly coarse to fine sand, little clayey fines, trace coarse to fine gravel, moist, Fill				
998.2	2.0									
997.7	2.5									
997.2	3.0									
996.7	3.5									
996.2	4.0									
995.7	4.5									
995.2	5.0									
994.7	5.5									
994.2	6.0	A-2								
993.7	6.5									
993.2	7.0									
992.7	7.5					Grades with some clayey fines and few coarse to fine gravel				
992.2	8.0	A-3				8.0				
991.7	8.5				SC	Brown clayey SAND; mostly fine sand, little clayey fines, trace coarse to fine gravel, moist, Fill				
991.2	9.0	A-4				8.8				
990.7	9.5				SC	Brown clayey SAND; mostly coarse to fine sand, some clayey fines, few coarse to fine gravel, moist, Fill				
990.2	10.0					10.0				
						End of Boring				

* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.

LOG OF BORING

Project No.: 211326
Boring No.: B-3
Sheet: 1 of 1

Project: Ann Arbor WTP Valve Replacement and Miscellaneous Water Storage Improvements
Client: Fishbeck
Location: Ann Arbor, Michigan
Drill Type: Hand Auger
Crew Chief: Field Eng.: JV Rev. By: RW
Coordinates: N=290846.1 E=13287124.2 (MI South ift)
Elevation: 1000.4 ft Datum: NAVD 88 (GPS Observation)
Notes:

Plugging Record: Backfilled with excavated soil.

Date Begin: 10/07/2021 Date End: 10/07/2021

Tooling	Type	Dia.	Groundwater, ft.	
Casing	Hand Auger	3 1/4"	During	None
Sampler			End	NA
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer				

Depth Drilled: 10.0 ft.

Component Percentages: Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

QP = Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Dyn. Cone Eq. "N": ASTM STP 399	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	DD pcf	REMARKS
999.9	0.5					11" Topsoil				Fill: 0' to 10.0'
999.4	1.0					0.9				
998.9	1.5	A-1			SC	Brown clayey SAND; mostly coarse to fine sand, some clayey fines, trace coarse to fine gravel, moist, Fill				
998.4	2.0									
997.9	2.5									
997.4	3.0									
996.9	3.5									
996.4	4.0									
995.9	4.5									
995.4	5.0	A-2								
994.9	5.5									
994.4	6.0									
993.9	6.5									
993.4	7.0									
992.9	7.5									
992.4	8.0	A-3								
991.9	8.5									
991.4	9.0					Grades gray at 9.4'				
990.9	9.5	A-4								
990.4	10.0					10.0				
						End of Boring				

* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.

LOG OF BORING

Project No.: 211326
Boring No.: B-4
Sheet: 1 of 1

Project: Ann Arbor WTP Valve Replacement and Miscellaneous Water Storage Improvements
Client: Fishbeck
Location: Ann Arbor, Michigan
Drill Type: Hand Auger
Crew Chief: Field Eng.: JV Rev. By: RW
Coordinates: N=290934.8 E=13286951.9 (MI South ift)
Elevation: 999.4 ft Datum: NAVD 88 (GPS Observation)
Notes:

Plugging Record: Backfilled with excavated soil.

Date Begin: 10/07/2021 Date End: 10/07/2021

Tooling	Type	Dia.	Groundwater, ft.	
Casing	Hand Auger	3 1/4"	During	None
Sampler			End	NA
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer				

Depth Drilled: 9.2 ft.

Component Percentages: Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

QP = Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Dyn. Cone Eq. "N": ASTM STP 399	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	DD pcf	REMARKS
998.9	0.5					12" Topsoil				Fill: 0' to 9.2'
998.4	1.0					1.0				
997.9	1.5	A-1			SC	Brown clayey SAND; mostly coarse to fine sand, little clayey fines, few coarse to fine gravel, moist, Fill				
997.4	2.0									
996.9	2.5									
996.4	3.0					3.2				
995.9	3.5	A-2			SP	Brown poorly graded SAND; mostly coarse to fine sand, few coarse to fine gravel, trace silty fines, moist, Fill Grades with clay lenses at 4.5'				
995.4	4.0									
994.9	4.5									
994.4	5.0					5.0				
993.9	5.5				SC	Brown clayey SAND; mostly coarse to fine sand, some clayey fines, few coarse to fine gravel, moist, Fill				
993.4	6.0									
992.9	6.5	A-3								
992.4	7.0					7.1				
991.9	7.5				SP	Brown poorly graded SAND with gravel; mostly coarse to fine sand, little coarse to fine gravel, trace silty fines, moist, Fill				
991.4	8.0									
990.9	8.5	A-4								
990.4	9.0					9.2				
						End of Boring				Auger refusal at 9.2' due to possible concrete structure, coarse gravel, or COBBLE

* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.

END OF SECTION 00 31 32

SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work covered by the Contract Documents comprises replacement of valves and improvements to the finished water tank and reservoir located at the City of Ann Arbor Water Treatment Plant, 919 Sunset Road, Ann Arbor, MI 48103 for the City of Ann Arbor Water Treatment Services Unit, Owner.

B. The Work includes the following major items:
   1. Replacement of existing 24-inch to 30-inch diameter valves at the Water Treatment Plant and valve manhole improvements.
   2. Miscellaneous repairs and improvements at the following finished water storage reservoirs and elevated tanks.
      a. WTP Reservoir.
      b. North Campus Reservoir.
      c. Liberty Reservoir.
      d. Manchester Elevated Storage Tank.
      e. North Campus Elevated Storage Tank.

1.3 GENERAL

A. Imperative Language: These Specifications (Divisions 01 through 40) are written in the imperative and abbreviated form. This imperative language of the technical specifications is directed at Contractor unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "shall be" and similar mandatory phrases by inference in the same manner as they are applied to notes on Drawings. The words "shall", "shall be" and similar mandatory phrases shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated in the imperative or otherwise.

B. Related Sections: Some Sections of these Specifications (Divisions 01 through 40) may include a paragraph titled "Related Sections". This paragraph is an aid to the Project Manual user and is not intended to include all Sections which may be related. It is Contractor's obligation to coordinate all Sections whether indicated under "Related Sections" or not.

C. Reference to the General Conditions: In Divisions 01 through 40, a reference to the General Conditions includes by inference all amendments or supplements in the Request for Proposal.

1.4 WORK UNDER OTHER CONTRACTS

A. Owner will award a Contract for furnishing and installation of the following work:
   1. HVAC Improvements - Phase II
   2. Bleach Tank Replacement
   3. Barton Pump Station Valve Improvements

B. Coordinate the schedule of work under other contracts with Owner and other contractors.

C. Cooperate with all contractors performing work on the site.

D. Copies of Contract Documents for work under separate contracts are available for review at the Engineer's office.

1.5 CONTRACTOR USE OF PREMISES

A. Limit use of premises to allow for Owner occupancy.

B. Areas for Contractor's trailers, equipment, and material storage, and Contractor's employee parking, shall be as agreed by Owner prior to the start of construction.

C. Coordinate use of premises under direction of the Owner.

D. Contractor responsible for all confined space entry requirements for all phases of the Work.

E. Where the Contract Documents identify certain site elements within the construction limits, such as sidewalks, drives, and streets, that must be kept open for public or the Owner’s use during construction, the Contractor shall be responsible for protection and maintenance of such elements as well.

F. Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, all Work at sites other than the Water Treatment Plant shall be restricted to the following hours:
   1. Monday Through Friday (Except Legal Holidays): 7:00 a.m. to 8:00 p.m.
   2. Saturday, Sundays or legal holidays with written approval of the Owner.

1.6 OCCUPANCY REQUIREMENTS

A. Owner Occupancy During Construction:
   1. The Owner will occupy or utilize premises during the entire period of construction, for conduct of the Owner’s normal operations. Cooperate with the Owner to minimize conflict and to facilitate the Owner's operations.
   2. Access to Abutting Properties, Facilities and Loading Docks: Provide at all times.
   3. Access for Emergency Vehicles:
      a. Provide at all times.
      b. Provide at least one clear lane during nonwork periods.
   4. Fire Hydrants: Provide access to at all times.
   5. Do not block fire access routes.
   6. Limit parking for construction vehicles to an area designated by the Owner.

1.7 SECURITY AND ACCESS

A. The City of Ann Arbor’s Water Treatment Plant is a limited access facility. The Contractor must comply with the City’s operational provisions for security including, but not limited to:
   1. Provide proper identification of employees.
   2. Provide and use photos IDs for all Contractor personnel.
   3. Maintain daily sign-in log of personnel and visitors.
   4. Provide a list of personnel and vehicles onsite.
   5. Maintain a daily log of vehicle license plate numbers onsite.
   6. Allow Owner to conduct background checks on Contractor’s personnel upon request.
   7. Notify the plant in advance of material deliveries to the site, including delivery contents. Owner will NOT accept deliveries on behalf of the Contractor.

B. These procedures may be revised by the City of Ann Arbor at any time, as needed.

C. Use of Owner’s security measures does not relieve Contractor of their responsibility to secure their own working spaces and materials.

D. Access to Site, Roadways, and Parking Areas:
   1. Contractor’s personnel shall park on public surface streets.
   2. It shall be the responsibility of the Contractor to obtain any permits required from the City of Ann Arbor and pay all associated fees.
   3. The Contractor shall be responsible for removal of snow in areas of the Contractor’s work.
   4. No excessive noise, radius, lights, or running engines on the public street.

PART 2 - PRODUCTS

2.1 OTHER MATERIALS

A. General: All other materials which are not specified herein and are not indicated on the Drawings, but are required for proper and complete performance of the Work.

B. Procedure:
1. Select new, first quality material.
2. Obtain Engineer's review.
3. Provide and install.

PART 3 - EXECUTION

3.1 CONTROL OF WATER POLLUTION

A. General Requirements:
1. The Contractor shall conduct their work in such manner as to prevent the entry of fuels, oils, bituminous materials, chemical, sewage, or other harmful materials into the City's water supply or on to the soil.
2. The Contractor shall take all necessary precautions to prevent the entry of these harmful materials including the use of tarps, planks, protective trusses, or scaffolding systems, or other Owner and Engineer approved methods.
3. Any vehicles or equipment with oil, fuel, or other fluid leaks shall not be allowed on the Site and shall be immediately removed upon detection.

END OF SECTION 01 11 00

SECTION 01 12 16 – WORK SEQUENCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Construction sequencing.

1.3 SEQUENCING AND SCHEDULING

A. Construction Sequence:
   1. Contractor is responsible for sequencing the work with the following general constraints:
      a. Only one unit out of three at the Water Treatment Plant Reservoir may be taken out of service at a time.
      b. Only one of the reservoirs or tanks may be taken out of service at a time.
      c. Finished water reservoirs and tanks may only be taken out of service between October 1 and April 30.

B. General:
   1. Contractor shall be solely responsible for all construction sequencing and scheduling required by the Contract Documents.
   2. Coordinate timing of all work with Owner.
   3. Coordinate timing and sequencing of Work on the Water Treatment Plant Reservoir to maintain operational use of at least two units of the reservoir at any time for the duration of the Work.
   4. This sequence is offered as a suggestion to Contractor and to emphasize critical tasks of the Work. It is not a complete list of all work to be completed.

C. Sequence Submittal:
   1. The sequence indicated in this Section is offered as a suggestion to Contractor.
   2. Submit a proposed sequence with appropriate times of starting and completion of tasks to Engineer for review.

D. Alternative Sequences: Contractor may propose alternative sequences to that indicated in item 1.3 of this Section in an attempt to reduce the disruption of the operation of the existing facility or to streamline the tasks of the Work.

E. Suggested Sequence of Work: See Division 01 Section “Project Coordination” for suggested sequence of Work. General sequencing information is noted below:
   1. The WTP reservoir may not be taken out of service concurrently with any of the other reservoirs or tanks.
   2. Only one reservoir or tank may be taken out of service at a time.
   3. Unit 3 of the WTP reservoir has the least impact on system operations.
   4. The North Campus Reservoir may only be taken out of service during the summer and must be coordinated with the University of Michigan.
   5. Contractor to schedule as much work related to any reservoir/unit or tank while out of service as feasible. The Contractor's schedule shall clearly indicate the Work to be completed during each facility shutdown. Additional costs associated with unscheduled shutdowns and re-filling/disinfection activities are the responsibility of the Contractor.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PROVISIONS

A. General:
   1. Perform the work to provide for:
      a. The water treatment facilities to be in effective operation at all times.
      b. Maintaining a treatment efficiency of not less than the efficiency achieved during the corresponding month of the previous year.

B. Notification of Owner: Notify Owner prior to beginning any of the proposed Work items. Notification requirements and work durations can be found in the project constraint summary in Division 01 Section “Summary of Work.”

END OF SECTION 01 12 16

SECTION 01 21 13 – ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section provides for cash allowances which are included in the Contract Price.

B. Related Sections include Sections in Divisions 01 through 40, as identified below, provide additional information on what is covered by the respective allowances.

1.3 SCHEDULE OF ALLOWANCES

A. Include in the Contract Price the following amounts:

Allowance Schedule	Base Bid #1	#2	#3	#4	#5
Permit Allowance	$ 7,500	$ 2,500	$ 2,500	$ 2,500	$ 2,500
Concrete Repair Allowance	$ 25,000	$ 10,000	$ 10,000		
Miscellaneous Repair Allowance	$ 50,000	$ 10,000	$ 10,000	$ 5,000	$ 5,000
Coating Inspection Services Allowance	$ 5,000				
Tank Inspection Services Allowance	$ 10,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Subtotal	**$ 97,500**	**$ 27,500**	**$ 27,500**	**$ 12,500**	**$ 12,500**

1.4 CASH ALLOWANCES

A. Costs Associated With Allowances:
   1. All costs, associated with allowances, which are not specifically defined in the Schedule of Allowances, Paragraph 1.3 of this Section shall be included in the Base Bid.
   2. Associated costs not specifically defined in the Schedule of Allowances may include, but are not necessarily limited to:
      a. Unloading.
      b. Handling on the Site.
      c. Labor.
      d. Installation.
      e. Overhead.
      f. Profit.

1.5 ADJUSTMENT OF COSTS

A. Change Order: To adjust Contract Price if final cost is different from allowance.

B. Documentation:
   1. Submit:
      a. Within 60 days after completion of the work under the allowance.
      b. Documentation of actual costs.
   2. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.
   3. At Contract closeout, reflect all approved changes in Contract amounts in the final statement of accounting.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related construction activities.

3.2 ALLOWANCE FOR PERMITS

A. A cash allowance shall be included for the cost of any permits not already procured by the Owner. This allowance shall only be used to pay for permit fees not included in the Contract scope. All paperwork and coordination between the Contractor and permitting agency shall be considered incidental to the Contract.

Base Bid	Allowance ($)
#1 – Water Treatment Plant – River Valve Replacement and Reservoir Improvements	$7,500
#2 – North Campus – Reservoir Improvements	$2,500
#3 – Liberty – Reservoir Improvements	$2,500
#4 – Manchester – Elevated Tank Improvements	$2,500
#5 – North Campus – Elevated Tank Improvements	$2,500

3.3 ALLOWANCE FOR CONCRETE REPAIRS

A. A cash allowance shall be included in the Contract Price for the additional concrete repair Work that the Owner approves in advance. This allowance shall only be used to pay for the pre-approved Work that exceeds the Contract scope. All paperwork and coordination between the Contractor and Owner shall be considered incidental to the Contract.

Base Bid	Allowance ($)
#1 – Water Treatment Plant – River Valve Replacement and Reservoir Improvements	$25,000
#2 – North Campus – Reservoir Improvements	$10,000
#3 – Liberty – Reservoir Improvements	$10,000

3.4 ALLOWANCE FOR MISCELLANEOUS REPAIRS

A. A cash allowance shall be included in the Contract Price for the miscellaneous additional Work that the Owner approves in advance. This allowance shall only be used to pay for the pre-approved Work that exceeds the Contract scope. All paperwork and coordination between the Contractor and Owner shall be considered incidental to the Contract.

Base Bid	Allowance ($)
#1 – Water Treatment Plant – River Valve Replacement and Reservoir Improvements	$50,000
#2 – North Campus – Reservoir Improvements	$10,000
#3 – Liberty – Reservoir Improvements	$10,000
#4 – Manchester – Elevated Tank Improvements	$5,000
#5 – North Campus – Elevated Tank Improvements	$5,000

3.5 ALLOWANCE FOR TANK INSPECTION SERVICES

A. Contractor shall pay all fees for the inspection of the tank or reservoir prior to acceptance of the Work. A cash allowance shall be included in the Contract Price for the payment of the inspection fees. This allowance shall only be used to pay for the inspection fees and cover coordination efforts to allow and assist with access to work areas. All paperwork and coordination between the Contractor and tank inspection service shall be considered incidental to the Contract.

Base Bid	Allowance ($)
#1 – Water Treatment Plant – River Valve Replacement and Reservoir Improvements	$10,000
#2 – North Campus – Reservoir Improvements	$5,000
#3 – Liberty – Reservoir Improvements	$5,000
#4 – Manchester – Elevated Tank Improvements	$5,000
#5 – North Campus – Elevated Tank Improvements	$5,000

B. For further information contact:

Company Nelson Tank Engineering & Consulting
Address 16240 National Parkway, Lansing MI 48906
Phone 517-321-1692

Or

Company Dixon Engineering Inc.
Address 1104 3rd Avenue, Lake Odessa MI 48849
Phone 616-374-3221

3.6 ALLOWANCE FOR COATING INSPECTION SERVICES

A. Contractor shall pay all fees for the inspection of gallery pipe coating prior to acceptance of the Work. A cash allowance shall be included in the Contract Price for the payment of the inspection fees. This allowance shall only be used to pay for the inspection fees. All paperwork and coordination between the Contractor and coating inspection service shall be considered incidental to the Contract.

Base Bid	Allowance ($)
#1 - Water Treatment Plant – River Valve Replacement and Reservoir Improvements	$5,000

B. For further information contact:

Company Nelson Tank Engineering & Consulting
Address 16240 National Parkway, Lansing MI 48906
Phone 517-321-1692

Or

Company Dixon Engineering Inc.
Address 1104 3rd Avenue, Lake Odessa MI 48849
Phone 616-374-3221

END OF SECTION 01 21 13

SECTION 01 22 00 - UNIT PRICES - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes descriptions of the method of measurement and the basis of payment for Unit Price Work under this Contract.

B. Basis of Contract Payments:
1. Final Contract Price shall be determined by actual quantities installed at unit prices stated in Contractor's Bid.
2. Engineer shall determine actual as-built quantities.
3. All work identified on the Drawings, but not included as a Bid item shall be considered incidental to construction and not paid for directly, except Work that would be considered additional Work due to unforeseen conditions.
4. Unit price payments for individual items shall include everything necessary for such item to function as intended in the system.
5. Owner reserves the right to increase, decrease or eliminate any quantities for items listed in Contractor's Bid or which become a part of the Contract Documents.

C. Items included as incidental to Unit Prices for systems and appurtenances. Unless there is a specific pay item identified, the unit price payment shall include, but not be limited to:
1. Clear, excavate, trench, bedding, trench backfill, compaction, disposal of items for clearing and unsuitable or excess excavated materials.
2. Drainage of excavations including by-pass pumping of sewers if necessary.
3. Temporary sheeting, bracing and shoring of excavations.
4. Support, relocation, replacement, connection or reconnection of existing pipelines and utilities.
5. Cleanup and surface restoration.
6. Water service repair.
7. Sewer lead repair.
8. Bulk head of pipes to be abandoned.
9. Removal of pipes, valves, structures and appurtenances located within the excavation limits of new utilities whether identified on the removal Drawings or not.
10. Coordination of mail delivery and refuse removal with residents, post office, and refuse collectors.
11. Dewatering for the installation of sanitary sewer, water main and storm sewer.
12. Support of utility poles and existing underground utilities during excavation and installation of sanitary sewer, water main and storm sewer.
13. Remove, salvage, and replace street signs.
14. Remove and dispense of trees less than 6-inches in diameter.
15. Temporary enclosures and sources of heat and humidity control to allow construction activity to proceed during cold weather and adverse conditions.
16. Testing of concrete repair materials.

1.3 GENERAL (Common to all Base Bids)

A. Item No. 1.1 – General Conditions, Max 10% of Individual Base Bid:
1. Includes:
   a. General Overhead.
   b. Project Management.
   c. Provide insurance, bonds, and other costs associated with the project in general and not included in other pay items.
   d. All required submittals.

2. Unit of Measure:
   a. Lump sum.
   b. 50% payment will be made after 5% of the original contract amount is earned.
   c. Final 50% payment will be made after 25% of the contract amount is earned.

B. Item No. 1.2 – Mobilization, Max 10% of Individual Base Bid:
1. Includes:
   a. Preparatory work and expenses incurred prior to beginning work onsite.
   b. Transport materials, personnel, and equipment to the Site.
   c. Establish temporary onsite construction facilities.
   d. Where applicable, establish, maintain and remove all temporary and permanent soil erosion control measures as indicated on the Drawings or as required by local enforcement authorities.
2. Unit of Measure:
   a. Lump sum.
   b. 50% payment will be made after 5% of the original contract amount is earned.
   c. Final 50% payment will be made after 25% of the contract amount is earned.

C. Item No. 1.3 – Certified Payroll Compliance and Reporting:
1. Includes:
   a. Documentation and submittal of compliance with City of Ann Arbor certified payroll reporting.
2. Measurement and Payment:
   a. Lump sum.
   b. 50% payment will be made on first pay application for the associated base bid item.
   c. Final 50% payment will be made on final pay application for the associated base bid item.

1.4 BASE BID #1 – WATER TREATMENT PLANT – RIVER VALVE REPLACEMENT AND RESERVOIR IMPROVEMENTS

A. Item No. 1.4 – Permit Allowance:
1. Includes cash allowance for obtaining permits not included in Contract Documents.
2. Unit of Measure:
   a. Cost for permit fees or inspections.
   b. Documented by invoice/receipt.

B. Item No. 1.5 – Miscellaneous Repair Allowance:
1. Includes cash allowance for miscellaneous repairs in accordance with the Specifications.
2. Unit of Measure:
   a. Cost For unforeseen repair work.
   b. General Contractor allowable markup is 10%.
   c. Documented by invoices, time and materials.

C. Item No. 1.6 – Concrete Repair Allowance:
1. Includes cash allowance for miscellaneous concrete repairs in accordance with Division 03 Section “Rehabilitation of Cast-in-Place Concrete.”
2. Unit of Measure:
   a. Cost for unforeseen cast-in-place concrete repair work.
   b. General Contractor allowable markup is 10%.
   c. Documented by invoices, time and materials.

D. Item No. 1.7 – Coating Inspection Services Allowance:
1. Includes cash allowance for coating inspection services in accordance with Division 01 Section “Special Inspections and Tests” and Division 09 Section “Steel Coatings.”
2. Unit of Measure:
   a. Cost for third-party coating inspection services.
   b. General Contractor allowable markup is 10%.
   c. Documented by invoices, time and materials.

E. Item No. 1.8 – Tank Inspection Services Allowance:
1. Includes cash allowance for coating inspection services in accordance with Division 01 Section “Special Inspections and Tests,” Division 05 Section “Elevated Steel Water Tank Miscellaneous Repairs,” and Section 09 Section “Steel Coatings.”

2. Unit of Measure:
    a. Cost for third-party tank inspection services.
    b. General Contractor allowable markup is 10%.
    c. Documented by invoices, time and materials.

F. Item No. 2.1 – Replace 30" Valve, Adjacent Piping and Supports:
1. Includes the following in accordance with Division 40 Sections "Process Piping Systems" and "Process Valves."
    a. Coordination with City staff for shutdown of existing pipeline to allow work to proceed.
    b. Clean existing sludge and debris from pipe pit (debris levels up to 50% of piping).
    c. Remove existing valve and piping including proper handling and disposal of any debris from leaded joints.
    d. Furnish and install valve and operator.
    e. Furnish and install adjacent piping and fittings, including piping for adjacent systems (i.e., sludge piping) as necessary to complete the Work. New piping includes coatings.
    f. Coordination with City staff to bring pipeline back into service.
    g. Cleanup of work area, and disposal of all waste and debris.
2. Unit of Measure: Lump Sum.

G. Item No. 2.2 – Salvage and Replace Existing Grating:
1. Includes the following in accordance with Division 05 Section "Metal Fabrications."
    a. Remove and salvage existing fiberglass grating.
    b. Furnish and install new steel frame.
    c. Reinstall existing fiberglass grating.
2. Unit of Measure: Lump Sum.

H. Item No. 2.3 – Replace Existing Hangers and Supports:
1. Includes the following in accordance with Division 05 Section "Metal Fabrications."
    a. Remove and replace all existing metallic pipe supports located inside and above the pipe pit.
    b. Furnish and install new hangers and supports.
2. Unit of Measure: Lump Sum.

I. Item No. 3.1 – Replace Reservoir Valves and Adjacent Piping:
1. Includes the following in accordance with Division 40 Sections "Process Piping Systems" and "Process Valves."
    a. Includes replacement of valves in AA WTP Reservoir Vaults #1 (Valve FW 6306), #3 (Valves FW 6307 & 6314), #4 (Valves FW 6308 & 6315), #5 (Valve FW 6318) and the Vault House (Valves 6305, 6316 & 6317).
    b. Coordination with City staff for shutdown of existing pipeline and associated reservoir units to allow work to proceed. Includes installation and removal of temporary cap in reservoir to facilitate shutdowns.
    c. Remove existing valves and piping including proper handling and disposal of any debris from leaded joints.
    d. Furnish and install valve, stem extension, supports and operator.
    e. Furnish and install adjacent piping and fittings, including coatings, anchors and supports.
    f. Coordination with City staff to bring pipeline back into service.
    g. Cleanup of work area, and disposal of all waste and debris.
2. Unit of Measure: Lump Sum.

J. Item No. 3.2 – Vault Structure Improvements:
1. Includes the following in accordance with Division 08 Section "Access Hatches," Division 33 Section "Site Process Piping Systems," and Division III "Materials Standards" of the City of Ann Arbor Standard Specifications.
    a. Includes structural improvements at the AA WTP Reservoir Vaults #1, 3, 4 and 5.
    b. All materials, equipment and labor for excavation, temporary shoring and backfill of the structure.
    c. Removal and disposal of existing manhole riser and structure top slab.
    d. Furnish and install new precast structure top slab, manhole riser sections and manhole top slab with access hatch and valve box adjusted to finished grade.
2. Unit of Measure: Lump Sum.

K. Item No. 3.3 – Vault House Grating Replacement:
   1. Includes the following in accordance with Division 05 Sections “Metal Fabrications” and “Metal Gratings.”
      a. Remove and existing steel grating.
      b. Furnish and install new steel grating to accommodate new valve operator openings.
   2. Unit of Measure: Lump Sum.

L. Item No. 4.1 – Filter Effluent Piping Spot Repair:
   1. Includes the following in accordance with Division 40 Section “Process Piping Systems” and Division 09 Sections “Painting” and “Steel Coatings.”
      a. Coordination with City staff for shutdown of existing pipelines to allow work to proceed.
      b. Removal of piping to be spot repaired.
      c. Furnish and install new piping and fittings.
      d. Complete all necessary surface preparation for new coating installation.
      e. Furnish and install coating system.
      f. Coordination with City staff to bring pipeline back into service.
      g. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

M. Item No. 4.2 – Filter Effluent Piping Pipe Repair Wrap:
   1. Includes the following in accordance with Division 40 Section “Carbon Fiber Reinforced Composite Repair for Process Piping.”
      a. Coordination with City staff for shutdown of existing pipelines to allow work to proceed.
      b. Complete all necessary surface preparation for pipe wrap installation.
      c. Furnish and install pipe wrap system.
      d. Coordination with City staff to bring pipeline back into service.
      e. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

N. Item No. 4.3 – Filter Effluent Piping Support Replacement:
   1. Includes the following in accordance with Division 03 “Cast-in-Place Concrete.”
      a. Temporarily support existing piping.
      b. Removal of existing pipe support.
      c. Furnish and install new pipe support.
      d. Removal of temporary pipe supports.
      e. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

O. Item No. 4.4 – Filter Effluent Piping Coating Replacement:
      a. Includes the following in accordance with Division 09 Sections “Painting” and “Steel Coatings.”
      b. Recoating of existing filter effluent piping, including removal of existing coating system, preparation and application of new coating system.
      c. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

P. Item No. 5.1 – Replace Air Vent Screens:
   1. Includes the following in accordance with Division 05 Section “Elevated Steel Water Tank Miscellaneous Repairs.”
      a. Lift top of vent off concrete pedestal.
      b. Remove and replace existing screen.
      c. Replace top of vent on concrete pedestal.
   2. Unit of Measure: Each.

Q. Item No. 5.2 – Modify Existing Reservoir Access Hatch #1:
   1. Includes the following in accordance with Division 03 “Cast-in-Place Concrete,” Division 08 Section “Access Hatches,” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary interior protection and backfill of the structure.
      b. Removal and disposal of existing hatch and concrete curb as needed for replacement.
      c. Furnish and install new cast-in-place structural concrete curb sections and with integral access hatch.
   2. Unit of Measure: Lump Sum.

R. Item No. 5.3 – Modify Existing Reservoir Access Hatch #2:
   1. Includes the following in accordance with Division 03 Section “Cast-in-Place Concrete,” Division 08 Section “Access Hatches,” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary interior protection and backfill of the structure.
      b. Removal and disposal of existing hatches and curb as needed for replacement.
      c. Furnish and install new cast-in-place structural concrete curb sections and with integral access hatches.
   2. Unit of Measure: Lump Sum.

S. Item No. 5.4 – Patch Concrete Spalls on Reservoir Ceiling, Shallow:
   1. Includes the following in accordance with Division 03 Section “Rehabilitation of Cast-in-Place Concrete.”
      a. Removal of all loose concrete per specification.
      b. Patching voids.
      c. Photo documentation of spall before and after repair.
   2. Unit of Measure: Each.

T. Item No. 5.5 – Coat Rebar and Patch Concrete Spalls on Reservoir Ceiling, Deep:
   1. Includes the following in accordance with Division 03 Section “Rehabilitation of Cast-in-Place Concrete.”
      a. Removal of loose concrete to depth as stated in specification.
      b. Coating of rebar.
      c. Patching voids.
      d. Photo documentation of spall before and after repair.
   2. Unit of Measure: Each.

U. Item No. 5.6 – Patch Concrete Spalls on Reservoir Walls, Shallow:
   1. Includes the following in accordance with Division 03 Section “Rehabilitation of Cast-in-Place Concrete.”
      a. Removal of all loose concrete per specification.
      b. Patching voids.
      c. Photo documentation of spall before and after repair.
   2. Unit of Measure: Each.

V. Item No. 5.7 – Coat Rebar and Patch Concrete Spalls on Reservoir Walls, Deep:
   1. Includes the following in accordance with Division 03 Section “Rehabilitation of Cast-in-Place Concrete.”
      a. Removal of loose concrete to depth as stated in specification.
      b. Coating of rebar.
      c. Patching voids.
      d. Photo documentation of spall before and after repair.
   2. Unit of Measure: Each.

W. Item No.5.8 – Re-Coat All Wet Interior Piping and Appurtenances:
   1. Includes the following in accordance with Division 09 Section “Steel Coatings.”
      a. Coordination with City staff for shutdown of existing reservoir units to allow work to proceed.
      b. Re-coating of all interior piping and appurtenances in all three reservoir units, including removal of existing coating system, preparation and application of new coating system.
      c. Coordination with City staff on reservoir filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

X. Item No. 5.9 – Modify Existing Overflow Piping:
   1. Includes the following in accordance with Division 33 Section “Site Process Piping Systems” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary shoring and backfill of the overflow pipe trench.
      b. Removal and disposal of existing overflow piping, including the capping/plugging of all pipes and reservoir penetrations.
      c. Coring existing reservoir wall for new overflow piping location.
      d. Furnish and install new overflow pipe, inside and outside of the reservoir. Includes all fittings, flap gates and screens.

e. Cast-in-place concrete headwall.
f. Removal of existing storm sewer frame and cover and furnish and install new storm sewer manhole frame and cover.

2. Unit of Measure: Lump Sum.

Y. Item No. 5.10 – Fire Hydrant:
1. Includes the following in accordance with Division 33 Section "Site Process Piping Systems" and Division III "Materials Standards" of the City of Ann Arbor Standard Specifications.
a. All materials, equipment and labor for excavation, temporary shoring and backfill of the fire hydrant and pipe trench.
b. Excavation to confirm pipe material and size.
c. Tapping sleeve and valve and tapping the existing 24-inch steel CW line.
d. Furnish and install tapping sleeve and valve, hydrant, pipe, and valve box.
e. Testing and acceptance of new water main piping.
2. Unit of Measure: Lump Sum.

Z. Item No. 5.11 – Site Restoration:
1. Includes the following in accordance with Division VIII "Landscaping and Restoration" of the City of Ann Arbor Standard Specifications.
a. Includes structural improvements at the AA WTP Reservoir Vaults #1, 3, 4, 5 and the Vault House (overflow modification).
b. Furnish, place, and grade 4" thick bed of topsoil.
c. Place seed.
d. Place mulch and mulch anchoring.
e. Maintain until final completion.
2. Does not include restoration of any areas disturbed due to Contractor's operation that are outside the limits of normal construction.
3. Unit of measure: Lump Sum

AA. Alternate #1 – Vault #2 Structure Improvements:
1. Includes the following in accordance with Division 08 Section "Access Hatches," Division 33 Section "Site Process Piping Systems," and Division III "Materials Standards" of the City of Ann Arbor Standard Specifications
a. Includes structural improvements at the AA WTP Reservoir Vaults #2.
b. All materials, equipment and labor for excavation, temporary shoring and backfill of the structure.
c. Removal and disposal of existing manhole riser and structure top slab.
d. Furnish and install new precast structure top slab, manhole riser sections and manhole top slab with access hatch and valve box adjusted to finished grade.
e. Site restoration.
2. Unit of Measure: Lump Sum.

BB. Alternate #2 – Remove Valve FW 6317 Replacement:
1. Includes the following in accordance with Division 33 Section "Site Process Piping Systems" and Division 40 Section "Process Valves."
a. Alternate to not replace Valve FW 6317.
2. Unit of Measure: N/A.

1.5 BASE BID #2 – NORTH CAMPUS – RESERVOIR IMPROVEMENTS

A. Item No. 1.4 – Permit Allowance:
1. Includes cash allowance for obtaining permits not included in Contract Documents.
2. Unit of Measure:
a. Cost for permit fees or inspections.
b. Documented by invoice/receipt.

B. Item No. 1.5 – Miscellaneous Repair Allowance:
1. Includes cash allowance for miscellaneous repairs in accordance with the Specifications.
2. Unit of Measure:
a. Cost for unforeseen repair work.
b. General Contractor allowable markup is 10%.
c. Documented by invoices, time and materials.

C. Item No. 1.6 – Concrete Repair Allowance:
   1. Includes cash allowance for miscellaneous concrete repairs in accordance with Division 03 Section "Rehabilitation of Cast-in-Place Concrete."
   2. Unit of Measure:
      a. Cost for unforeseen cast-in-place concrete repair work.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

D. Item No. 1.7 – Tank Inspection Services Allowance:
   1. Includes cash allowance for coating inspection services in accordance with Division 01 Section "Special Inspections and Tests," Division 05 Section "Elevated Steel Water Tank Miscellaneous Repairs," and Section 09 Section "Steel Coatings."
   2. Unit of Measure:
      a. Cost for third-party tank inspection services.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

E. Item No. 2.1 – Modify Existing Reservoir Access Hatch #1:
   1. Includes the following in accordance with Division 03 Section "Cast-in-Place Concrete," Division 08 Section "Access Hatches," and Division III "Materials Standards" of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary interior protection and backfill of the structure.
      b. Removal and disposal of existing manhole frames and covers and concrete curb as needed for replacement.
      c. Furnish and install new cast-in-place structural concrete curb sections and with integral access hatch.
   2. Unit of Measure: Lump Sum.

F. Item No. 2.2 – Modify Existing Reservoir Access Hatch #2:
   1. Includes the following in accordance with Division 03 Section "Cast-in-Place Concrete," Division 09 Sections "Steel Coatings" and "Painting," Division 08 Section "Access Hatches," Division 33 Section "Site Process Piping", and Division III "Materials Standards" of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary interior protection and backfill of the structure.
      b. Removal and disposal of existing hatches and curb as needed for replacement.
      c. Removal of existing louvre grating and masonry modifications.
      d. Furnish and install new cast-in-place structural concrete curb sections, with wall sleeves and with integral access hatches.
      e. Furnish and Install vent piping, and supports.
   2. Unit of Measure: Lump Sum.

G. Item No. 2.3 – Re-Coat All Wet Interior Piping and Appurtenances:
   1. Includes the following in accordance with Division 09 Section "Steel Coatings."
      a. Coordination with City staff for shutdown of existing reservoir to allow work to proceed.
      b. Re-coating of all interior piping and appurtenances inside the two units of the reservoir, including removal of existing coating system, preparation and application of new coating system.
      c. Coordination with City staff on reservoir filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

H. Item No. 2.4 – Modify Existing Overflow Piping:
   1. Includes the following in accordance with Division 33 Section "Site Process Piping Systems" and Division III "Materials Standards" of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary shoring and backfill of the overflow pipe trench.
      b. Coring existing reservoir overflow structure wall for new overflow piping location.
      c. Furnish and install new overflow pipe, inside and outside of the reservoir. Includes all fittings, flap gates and screens.
      d. Cast-in-place concrete headwall.
   2. Unit of Measure: Lump Sum.

I. Item No. 2.5 – Site Restoration:
   1. Includes the following in accordance with Division VIII “Landscaping and Restoration” of the City of Ann Arbor Standard Specifications.
      a. Furnish, place, and grade 4-inch-thick bed of topsoil.
      b. Place seed.
      c. Place mulch and mulch anchoring.
      d. Maintain until final completion.
   2. Does not include restoration of any areas disturbed due to Contractor’s operation that are outside the limits of normal construction.
   3. Unit of Measure: Lump Sum.

J. Alternate #3 – Relocate Existing Reservoir Access Hatch #1:
   1. Includes the following in accordance with Division 03 Section “Cast-in-Place Concrete,” Division 08 Section “Access Hatches,” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary interior protection and backfill of the structure.
      b. Removal and disposal of existing manhole frames and covers and concrete curb as needed for replacement.
      c. Abandonment of existing access hatches.
      d. Furnish and install new cast-in-place structural concrete curb sections and with integral access hatch.
      e. Furnish and install new ladder rungs into reservoir.
   2. Unit of Measure: Lump Sum.

1.6 BASE BID #3 – LIBERTY – RESERVOIR IMPROVEMENTS

A. Item No. 1.4 – Permit Allowance:
   1. Includes cash allowance for obtaining permits not included in contract documents.
   2. Unit of Measure:
      a. Cost for permit fees or inspections.
      b. Documented by invoice/receipt.

B. Item No. 1.5 – Miscellaneous Repair Allowance:
   1. Includes cash allowance for miscellaneous repairs in accordance with the Specifications.
   2. Unit of Measure:
      a. Cost for unforeseen repair work.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

C. Item No. 1.6 – Concrete Repair Allowance:
   1. Includes cash allowance for miscellaneous concrete repairs in accordance with Division 03 Section “Rehabilitation of Cast-in-Place Concrete.”
   2. Unit of Measure:
      a. Cost for unforeseen cast-in-place concrete repair work.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

D. Item No. 1.7 – Tank Inspection Services Allowance:
   1. Includes cash allowance for coating inspection services in accordance with Division 01 Section “Special Inspections and Tests,” Division 05 Section “Elevated Steel Water Tank Miscellaneous Repairs,” and Division 09 Section “Steel Coatings.”
   2. Unit of Measure:
      a. Cost for third-party tank inspection services.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

E. Item No. 2.1 – Modify Existing Overflow Piping:
   1. Includes the following in accordance with Division 33 Section “Site Process Piping Systems” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications.
      a. All materials, equipment and labor for excavation, temporary shoring and backfill of the overflow pipe trench.
      b. Coring existing reservoir overflow structure wall for new overflow piping location.
      c. Furnish and install new overflow pipe, inside and outside of the reservoir. Includes all fittings, flap gates and screens.
      d. Cast-in-place concrete headwall.
   2. Unit of Measure: Lump Sum.

F. Item No. 2.2 – Modify Existing Reservoir Access Hatch #1:
   1. Includes the following in accordance with Division 03 Section “Cast-in-Place Concrete,” Division 08 Section “Access Hatches,” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications
      a. All materials, equipment and labor for excavation, temporary interior protection and backfill of the structure.
      b. Removal and disposal of existing manhole frames and covers and concrete slab as needed for replacement.
      c. Furnish and install new cast-in-place structural concrete curb sections and with integral access hatch.
   2. Unit of Measure: Lump Sum.

G. Item No. 2.3 – Modify Existing Reservoir Access Hatch #2:
   1. Includes the following in accordance with Division 03 Section “Cast-in-Place Concrete,” Division 08 Section “Access Hatches,” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications
      a. All materials, equipment and labor for excavation, temporary interior protection and backfill of the structure.
      b. Removal and disposal of existing hatches and curb as needed for replacement.
      c. Removal of existing louvre grating and masonry modifications.
      d. Furnish and install new cast-in-place structural concrete curb sections, with wall sleeves and with integral access hatches.
      e. Furnish and Install vent piping, and supports.
   2. Unit of Measure: Lump Sum.

H. Item No. 2.4 – Re-Coat All Wet Interior Piping and Appurtenances:
   1. Includes the following in accordance with Division 09 Section “Steel Coatings.”
      a. Coordination with City staff for shutdown of existing reservoir to allow work to proceed.
      b. Re-coating of all interior piping and appurtenances inside the reservoir, including removal of existing coating system, preparation and application of new coating system.
      c. Coordination with City staff on reservoir filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

I. Item No. 2.5 – Patch Concrete Spalls on Reservoir Walls, Shallow:
   1. Includes the following in accordance with Division 03 Section “Rehabilitation of Cast-in-Place Concrete.”
      a. Removal of all loose concrete per specification.
      b. Patching voids.
      c. Photo documentation of spall before and after repair.
   2. Unit of Measure: Each

J. Item No. 2.6 – Site Restoration:
   1. Includes the following in accordance with Division VIII “Landscaping and Restoration” of the City of Ann Arbor Standard Specifications.
      a. Furnish, place, and grade 4-inch-thick bed of topsoil.
      b. Place seed.
      c. Place mulch and mulch anchoring.
      d. Maintain until final completion.

2. Does not include restoration of any areas disturbed due to Contractor's operation that are outside the limits of normal construction.
3. Unit of Measure: Lump Sum

1.7 BASE BID #4 – MANCHESTER – ELEVATED TANK IMPROVEMENTS

A. Item No. 1.4 – Permit Allowance:
   1. Includes cash allowance for obtaining permits not included in Contract Documents.
   2. Unit of Measure:
      a. Cost for permit fees or inspections.
      b. Documented by invoice/receipt.

B. Item No. 1.5 – Miscellaneous Repair Allowance:
   1. Includes cash allowance for miscellaneous repairs in accordance with the Specifications.
   2. Unit of Measure:
      a. Cost for unforeseen repair work.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

C. Item No. 1.6 – Tank Inspection Services Allowance:
   1. Includes cash allowance for coating inspection services in accordance with Division 01 Section "Special Inspections and Tests," Division 05 Section "Elevated Steel Water Tank Miscellaneous Repairs," and Section 09 Section "Steel Coatings."
   2. Unit of Measure:
      a. Cost for third-party tank inspection services.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

D. Item No. 2.1 – Install 2-1/2" Check Valve on Condensate Drain:
   1. Includes the following in accordance with Division 05 Section "Elevated Steel Water Tank Miscellaneous Repairs."
      a. Coordination with City staff for access to tank to allow work to proceed.
      b. All materials, equipment and labor for the condensate drain modifications to install new check valve.
      c. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

E. Item No. 2.2 – Replace Gasket on Access Tube Roof Hatch:
   1. Includes the following in accordance with Division 05 Section "Elevated Steel Water Tank Miscellaneous Repairs."
      a. Coordination with City staff for access to tank to allow work to proceed.
      b. All materials, equipment and labor for the replacement of the access tube roof hatch.
      c. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

F. Item No. 2.3 – Replace Existing Screen on 8" Overflow Pipe:
   1. Includes the following in accordance with Division 05 Section "Elevated Steel Water Tank Miscellaneous Repairs."
      a. Remove and replace existing screen from 8-inch overflow pipe.
   2. Unit of Measure: Each.

G. Alternate #4 – Replace Wet Interior Roof Hatch:
   1. Includes the following in accordance with Division 05 Section "Elevated Steel Water Tank Miscellaneous Repairs."
      a. Coordination with City staff for access to tank to allow work to proceed.
      b. All materials, equipment and labor for the removal and replacement of the wet interior roof hatch.
      c. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

H. Alternate #5 – Install Cathodic Protection in Wet Interior:
   1. Includes the following in accordance with Division 03 Section “Cast-in-Place Concrete,” Division 08 Section “Access Hatches,” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications.
      a. Coordination with City staff for shutdown of existing tank to allow work to proceed.
      b. Furnish and install cathodic protection system.
      c. Coordination with City staff on reservoir filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

I. Alternate #6 – Install Fall Protection Device on Wet Interior Ladder:
   1. Includes the following in accordance with Division 03 Section “Cast-in-Place Concrete,” Division 08 Section “Access Hatches,” and Division III “Materials Standards” of the City of Ann Arbor Standard Specifications
      a. Coordination with City staff for shutdown of existing tank to allow work to proceed.
      b. Furnish and install fall protection system on wet interior ladder.
      c. Coordination with City staff on reservoir filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

1.8 BASE BID #5 – NORTH CAMPUS – ELEVATED TANK IMPROVEMENTS

A. Item No. 1.4 – Permit Allowance:
   1. Includes cash allowance for obtaining permits not included in Contract Documents.
   2. Unit of Measure:
      a. Cost for permit fees or inspections.
      b. Documented by invoice/receipt.

B. Item No. 1.5 – Miscellaneous Repair Allowance:
   1. Includes cash allowance for miscellaneous repairs in accordance with the Specifications.
   2. Unit of Measure:
      a. Cost for unforeseen repair work.
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

C. Item No. 1.6 – Tank Inspection Services Allowance:
   1. Includes cash allowance for coating inspection services in accordance with Division 01 Section “Special Inspections and Tests,” Division 05 Section “Elevated Steel Water Tank Miscellaneous Repairs,” and Division 09 Section “Steel Coatings”.
   2. Unit of Measure:
      a. Cost for third-party tank inspection services
      b. General Contractor allowable markup is 10%.
      c. Documented by invoices, time and materials.

D. Item No. 2.1 – Dry Interior Maintenance Painting:
   1. Includes the following in accordance with Division 09 Section “Steel Coatings.”
      a. Coordination with City staff for access to tank to allow work to proceed.
      b. Interior steel preparation and maintenance painting of dry interior, including walls, platforms, ladders, rails and all metallic surfaces.
      c. Coordination with City staff on tank filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

E. Item No. 2.2 – Replace Missing Fill Pipe Insulation and Frost Jacket:
   1. Includes the following in accordance with Division 05 Section “Elevated Steel Water Tank Miscellaneous Repairs.”
      a. All materials, equipment and labor for the replacement of missing areas of insulation and frost jacket on existing tank fill pipe.
      b. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

F. Item No. 2.3 – Re-Coat Valve Pit Piping and Appurtenances:
   1. Includes the following in accordance with Division 09 Section “Steel Coatings.”
      a. Coordination with City staff for access to tank to allow work to proceed.
      b. Re-coating of all valve pit piping and appurtenances inside the tank basebell, including removal of existing coating system, preparation and application of new coating system.
      c. Coordination with City staff on reservoir filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

G. Item No. 2.4 – Replace Gasket on Wet Interior Roof Hatch:
   1. Includes the following in accordance with Division 05 Section “Elevated Steel Water Tank Miscellaneous Repairs.”
      a. All materials, equipment and labor for the replacement of the wet interior roof hatch.
      b. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

H. Item No. 2.5 – Replace Existing Screen on 8” Overflow Pipe:
   1. Includes the following in accordance with Division 05 Section “Elevated Steel Water Tank Miscellaneous Repairs.”
      a. Remove and replace existing screen from 8-inch overflow pipe.
   2. Unit of Measure: Each.

I. Alternate #7 – Spot Coat Wet Interior Roof:
   1. Includes the following in accordance with Division 09 Section “Steel Coatings.”
      a. Coordination with City staff for shutdown of existing tank to allow work to proceed.
      b. Removal of defective coating system, surface preparation and spot-coating of the wet interior roof.
      c. Coordination with City staff on tank filling, disinfection and bringing back into service.
      d. Cleanup of work area, and disposal of all waste and debris.
   2. Unit of Measure: Lump Sum.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 22 00

SECTION 01 23 00 – ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section identifies each alternate and describes the basic changes to be incorporated into the Work, only when that alternate is made a part of the Work by specific provisions of the Contract Documents.

1.3 SCHEDULE OF ALTERNATES

A. Alternate #1:
   1. ***Vault #2 Structure Improvements:***
      a. Base Bid #1 does not include pay item for Vault #2 Structure Improvements as indicated on Sheet 28.
      b. Add Item “Alternate #1 – Vault #2 Structure Improvements” to Base Bid #1 as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheet 28.

B. Alternate #2:
   1. ***Remove Valve FW 6317 Replacement:***
      a. Delete the replacement of Valve FW 6317 from Base Bid #1 Item 3.1, as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheets 12 and 13.
      b. Add Item “Alternate #2 – Remove Valve FW 6317 Replacement” to Base Bid #1 as specified in Division 01 Section “Unit Prices – Measurement and Payment.”

C. Alternate #3:
   1. ***Relocate Existing Reservoir Access Hatch #1:***
      a. Delete Base Bid #2 Item 2.1 “Modify Existing Reservoir Access Hatch #1” from the bid form, as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheet 27.
      b. Add Item “Alternate #3 – Relocate Existing Reservoir Access Hatch #1” to Base Bid #2 as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheet 29.

D. Alternate #4:
   1. ***Replace Wet Interior Roof Hatch:***
      a. Base Bid #4 does not include pay item for Replace Wet Interior Roof Hatch as indicated on Sheet 22.
      b. Add Item “Alternate #4 – Replace Wet Interior Roof Hatch” to Base Bid #4 as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheet 22.

E. Alternate #5:
   1. ***Install Cathodic Protection in Wet Interior:***
      a. Base Bid #4 does not include pay item for Install Cathodic Protection in Wet Interior as indicated on Sheet 22.
      b. Add Item “Alternate #5 – Install Cathodic Protection in Wet Interior” to Base Bid #4 as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheet 22.

F. Alternate #6:
   1. ***Install Fall Protection Device on Wet Interior Ladder:***
      a. Base Bid #4 does not include pay item for Install Fall Protection Device on Wet Interior Ladder as indicated on Sheet 22.
      b. Add Item “Alternate #6 – Install Fall Protection Device on Wet Interior Ladder” to Base Bid #4 as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheet 22.

G. Alternate #7:
   1. ***Spot Coat Wet Interior Roof:***
      a. Base Bid #5 does not include pay item for Spot Coat Wet Interior Roof as indicated on Sheet 23.
      b. Add Item “Alternate #7 – Spot Coat Wet Interior Roof” to Base Bid #5 as specified in Division 01 Section “Unit Prices – Measurement and Payment” and as indicated on Sheet 23.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 23 00

SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedures for modifying the Contract Documents.

1.3 DEFINITIONS

A. Terms:
   1. Bulletin: A document delineating possible changes to the Contract Documents which is issued by Engineer for Owner and requests add or deduct costs from Contractor.
   2. Field Order: As defined in the General Conditions, a written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contact Times.
   3. Work Change Directive: As defined in the General Conditions, a written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies.
   4. Change Order: As defined in the General Conditions, a document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
   5. Request for Information: A written document initiated by Contractor which requests clarifications to items of the Work from Engineer.

1.4 BULLETIN

A. Procedures: As indicated herein.

B. Changes in Cost:
   1. Indicate add or deduct lump sum for each item.
   2. Include:
      a. Labor.
      b. Material.
      c. Overhead and profit.
      d. All related Work.
      e. All trades and subcontractors.
   3. Provide a complete cost breakdown with supporting documentation.

C. Notification to Engineer: Notify Engineer in writing if any of the listed items will cause a change in the Work for which a cost item is not provided in this Bulletin.

D. Submit one copy to the Engineer on or before the due date noted.

E. If Bulletin is accepted, Owner may issue one or more Change Orders for some or all items listed.

1.5 FIELD ORDER

A. Changes in Contract Price or Contract Times not permitted by use of Field Orders.

B. Format:
   1. May take form of any written communication mutually acceptable to Engineer and Contractor, including, but not necessarily limited to:
      a. Letter.
      b. Email correspondence.
      c. Hand drawn or computer generated sketch.

C. Procedures: Refer to the General Conditions.

1.6 WORK CHANGE DIRECTIVE

A. Procedures: Refer to the General Conditions.

1.7 CHANGE ORDER

A. Procedures: Refer to the General Conditions and use Owner-provided form.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01 26 00

SECTION 01 26 13 – REQUESTS FOR INFORMATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedures for Contractor to give notice of conflicts, errors, ambiguities, or discrepancies in the Contract Documents.

1.3 DEFINITIONS

A. Abbreviation: Request for Information (RFI).

1.4 REQUESTS FOR INFORMATION

A. Format:
   1. Use the enclosed RFI form or, at Contractor's option, generate form.
   2. Minimum required content of Contractor's RFI form:
      a. Project name.
      b. Name and address of Contractor.
      c. RFI number.
      d. RFI date.
      e. Name of initiator.
      f. Complete written request, with sketches as required.
      g. Signature of initiator.
      h. Space for written response by Engineer, with signature and date of Engineer's representative.

B. Procedures:
   1. Maintain a log of RFIs, including the RFI date and the date of the response.
   2. Allow at least 15 full working days for Engineer's response following Engineer's receipt of RFI.
   3. Submit written justification for shorter response time.
   4. Do not submit RFIs for information already included in the Contract Documents.
   5. Illegitimate RFIs may be cause for deductions in the Contract amount.
   6. RFIs submitted directly by subcontractors or vendors will be rejected.
   7. Changes in Contract Price or Contract Times not permitted within an RFI form.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 SCHEDULES

A. Attached is the following form:
   1. Request for Information.

REQUEST FOR INFORMATION
PAGE 1 OF 1

CONTRACT FOR:	PROJECT NO.:
OWNER:	
CONTRACTOR:	
ENGINEER:	
THE CONTRACTOR SHALL COMPLY WITH THE PROCEDURES IN DIVISION 01 SECTION "REQUESTS FOR INFORMATION."	

RFI No.: _____

Fishbeck Project Manager: _____

REQUEST		
RFI From:	**Signature:**	**Date:**

RESPONSE		
Response From:	**Signature:**	**Date:**

END OF SECTION 01 26 13

SECTION 01 29 16 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes submittal to the Owner's designee of Applications for Payment and supporting documentation as specified herein.

1.3 OWNER'S INSTRUCTIONS

A. Schedule of Values:
   1. Coordinate preparation of Schedule of Values with preparation of Contractor's Construction Schedule.
   2. Correlate line items on Schedule of Values with other required administrative schedules and forms, including:
      a. Contractor's Construction Schedule.
      b. Application for Payment form.
      c. List of subcontractors.
      d. Schedule of Alternates.
      e. List of products.
      f. List of principal suppliers and fabricators.
      g. Schedule of Submittals.
   3. Submit Schedule of Values to Engineer at the earliest feasible date, within 14 days after Notice to Proceed.
   4. Format and Content: Use the Table of Contents for the Detailed Specifications as a guide to establish the format for Schedule of Values.
   5. Identification: Include the following project identification on Schedule of Values:
      a. Project name and location.
      b. Name of Engineer.
      c. Project number.
      d. Contractor's name and address.
      e. Date of submittal.
   6. Arrange Schedule of Values in a tabular form with separate rows for each Specification Section and separate columns for each major structure or area of Work.
   7. Provide a breakdown of the Contract Price in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
   8. Round off amounts to the nearest whole dollar; the total shall equal the Contract Price.
   9. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
   10. Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually on Applications for Payment. Each item on Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
   11. At Contractor's option, temporary facilities and other major cost items that are not a direct cost of actual work-in-place may be shown as separate line items on Schedule of Values or distributed as general overhead expense.
   12. Update and resubmit Schedule of Values when Change Orders or Work Change Directives result in a change in the Contract Price.

1.4 APPLICATION FOR PAYMENT

A. Initial Application for Payment: Administrative actions and submittals that must precede submittal of the first Application for Payment include the following:
   1. List of subcontractors.
   2. List of principal suppliers and fabricators.
   3. Schedule of Values.
   4. Contractor's Construction Schedule (preliminary if not final).
   5. Schedule of principal products.
   6. Schedule of Submittals (preliminary if not final).

B. Applications For Payment:
   1. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
   2. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
   3. The date for each progress payment will be determined at the Preconstruction Conference. The period of construction Work covered by each Application for Payment is one month. Actual start/end dates will be determined at the Preconstruction Conference.
   4. Use the AIA (American Institute of Architects) Application and Certification for Payment form for Applications for Payment.
   5. Complete every entry on the form, including execution by person authorized to sign legal documents on behalf of Contractor. Incomplete applications will be returned without action.
   6. Entries shall match data on Schedule of Values and Contractor's Construction Schedule. Use updated Schedules if revisions have been made.
   7. Include amounts of Change Orders and Work Change Directives issued prior to the last day of the construction period covered by the application.
   8. Submit 1 executed electronic copy of each Application for Payment to Engineer; each submittal shall be complete, including waivers of lien and similar attachments, when required.
   9. Transmit each submittal with a transmittal form listing attachments and recording appropriate information related to the application in a manner acceptable to Engineer.

C. Application for Payment at Substantial Completion:
   1. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
   2. Administrative actions and submittals that shall proceed or coincide with this application include:
      a. Warranties (guarantees) and maintenance agreements.
      b. Maintenance instructions.
      c. Final cleaning.
      d. Application for reduction of retainage and consent of surety.
      e. Final progress photographs.
      f. List of incomplete Work, recognized as exceptions to Engineer's Certificate of Substantial Completion.

D. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
   1. Completion of Project closeout requirements.
   2. Completion of items specified for completion after Substantial Completion.
   3. Transmittal of required Project construction records to Owner.
   4. Proof that taxes, fees, and similar obligations have been paid.
   5. Removal of temporary facilities and services.
   6. Removal of surplus materials, rubbish, and similar elements.
   7. Contractor's waivers of mechanics liens for Project.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 29 16

SECTION 01 31 00 – PROJECT COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   1. Scheduling:
      a. Coordination of Work under this Contract.
      b. Administrative and supervisory personnel.
   2. Preconstruction conference.
   3. Progress meetings.
   4. Inspections
   5. Valve isolation.
   6. Finished Water Reservoir and Elevated Tank shutdowns.

B. Related Sections Specified Elsewhere:
   1. Requirements for Contractor's Construction Schedule are included in Division 01 Section "Construction Progress Schedule."
   2. Closeout procedures are included in Division 01 Section "Closeout Procedures."

1.2 SUBMITTALS

A. Within 15 days of Notice to Proceed, submit a list of Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at Site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

1.3 SCHEDULING

A. For general guidance only, the anticipated Notice to Proceed date is September 1, 2022.

B. The Contractor shall NOT be permitted to begin any work involving finished water reservoir or elevated tank shutdowns until WTP peak flow season is over. This typically occurs in late September/early October. For general guidance assume October 1, 2022, as earliest date for shutdowns.

C. Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, all Work at the site shall be restricted to the following hours:
   1. Monday through Friday (except City holidays): 7 a.m. to 8 p.m.
   2. Saturdays with written approval of the Owner.
   3. Sundays or City holidays not permitted.

D. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair. Make adequate provisions to accommodate items scheduled for later installation.

E. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of schedules
   2. Installation and removal of temporary facilities.
   3. Delivery and processing of submittals.
   4. Progress meetings.
   5. Project closeout activities.

1.4 GENERAL CONSTRAINTS

A. The Contractor shall schedule the Work so that the plant is maintained in continuous operation. All treatment processes shall be maintained in continuous operation during the construction period except during approved process interruptions. Shutdowns and diversions shall conform to the requirements hereinafter specified and shall be minimized by the Contractor as much as possible. If in the judgment of the Engineer a requested shutdown is not required for the Contractor to perform the Work, the Contractor shall utilize approved alternative methods to accomplish the Work. All shutdowns shall be coordinated with and scheduled at times suitable to the Owner. Shutdowns shall not begin until all required materials are on hand and ready for installation. Each shutdown period shall commence at a time approved by the Owner. If the Contractor completes all required Work before the specified transfer period has ended, the Owner may immediately place the existing system back into service.

B. The Contractor shall give Owner advance notice of proposed shutdowns of any pipe, process, equipment, tank, treatment train, or power source, and shall present all desired shutdowns in the 30 and 60 day schedules at the progress meetings. Shutdowns shall be fully coordinated with the Owner at least 30 days before the scheduled shutdown. Contractor shall lockout/tagout equipment and power sources involved in the shutdowns and diversions. The Owner’s personnel shall operate Owner's facilities during shutdowns.

C. The Contractor shall submit a proposed written plan of work, with a request to schedule shutdown work for Owner and Engineer approval. Work plan shall include sequence of events, needs for coordination with plant staff, plans for lock-out/tag-out, contingency plans for how to return equipment and tanks to service early if needed for emergencies, and details of how the duration of the shut-down will be minimized.

D. Short-term shutdowns (24 hours or less) shall require 7 days prior notice to schedule date and time with Owner, unless otherwise noted herein. Once a short-term shutdown starts, Contractor shall work continuously until the work is complete and the disrupted process or system can be returned to service. Long-term shutdowns (longer than 24 hours) shall require 30 days prior notice to schedule date and time with Owner, unless otherwise noted herein. The Contractor shall submit a plan of work showing sequence of events throughout shutdown period, and listing all items requiring coordination with Owner’s staff. The Contractor shall schedule a coordination meeting with the Owner prior to the initiation of a long-term shutdown. Once a long-term shutdown starts, Contractor shall work on the shutdown area full days, every regular work day, until the work is complete and the disrupted process or system can be returned to service, unless otherwise required herein.

E. Any temporary work, facilities, roads, walks, protection of existing structures, piping, blind flanges, valves, equipment, etc. that may be required within the Contractor's work limits to maintain continuous and dependable plant operation shall be furnished by the Contractor at the direction of the Owner or Engineer at no extra cost to the Owner.

F. The Owner shall have the authority to order work stopped or prohibited that would, in his opinion, unreasonably result in interrupting the necessary functions of the plant operations. The Owner reserves the right to cancel a scheduled shutdown, without additional compensation due the Contractor, and will consider a contract extension if the cancellation affects the contractor’s critical path.

G. Unless specifically required by this specification, the Contractor shall not request more than one shutdown occur simultaneously.

H. If the Contractor impairs performance or operation of the plant as a result of not complying with specified provisions for maintaining plant operations, then the Contractor shall immediately make all repairs or replacements and do all work necessary to restore the plant to operation to the satisfaction of the Owner and Engineer. Such work shall progress continuously to completion 24 hours per day and seven work days per week.

I. After any damage to the existing facilities by the Contractor’s Work that, in the opinion of the Owner, constitutes an emergency, the Contractor shall be immediately available and provide immediate services for the repair of damage and mitigation of the emergency.

J. Shutdowns shall be scheduled between Monday and Friday, unless there are extenuating circumstances approved by the Engineer.

1.5 WORK SEQUENCE

A. Contractor shall prepare and submit to Engineer for approval, a complete detailed working schedule in compliance with the Owner's schedule, setting forth the sequence of operations Contractor proposes to follow. No work shall commence until the Owner/Engineer has approved this plan.

B. To maintain operation of the water treatment plant, the valve replacement shall be done in a staged approach. Contractor shall sequence work to ensure the water treatment plant is uninterrupted, and no more than one unit of the water treatment plant reservoir is out of service at any given time.

C. The suggested sequence for staged construction is provided below; it may possible that some stages can be performed concurrently. Contractor shall verify valve IDs prior to submitting proposed sequence of operations to Owner for review and approval. Coordinate closely with Owner for each stage. See Table 1 for a summary of work items, suggested sequence, notices required to Owner, durations, and liquidated damages.
   1. Complete River Valve Replacement.
   2. Complete Filter Effluent Piping Improvements.
   3. Complete Valve Replacement associated with the Water Treatment Plant Reservoir and other miscellaneous improvements.
   4. Complete North Campus Reservoir Improvements.
   5. Complete Liberty Reservoir Improvements.
   6. Complete Manchester Elevated Tank Improvements.
   7. Complete North Campus Elevated Tank Improvements.

Table 1 – Ann Arbor WTP Valve Replacement and Finished Water Tank and Reservoir Improvements Task and Work Constraints Summary[1, 2]

Item	Notice to Owner	Maximum Work Duration[3]	Allowable Dates	Critical Notes	Liquidated Damages
WTP – River Valve Replacement	14 days	30 Days	October 1 – May 15	Plant 1 Out of Service	$1,000/day
WTP – Reservoir Improvements	14 days	See Table 2	October 1 – May 15		See Table 2
WTP – Filter Effluent Piping Improvements	14 days				$1,000/day
North Campus – Reservoir Improvements	30 days	45 Days	May 15 – August 15	Coordinate with University of Michigan	$1,000/day
Liberty – Reservoir Improvements	14 days	45 Days	October 1 – May 15		$1,000/day
Manchester - Elevated Tank Improvements	14 days	45 Days	October 1 – May 15		$1,000/day
North Campus – Elevated Tank Improvements	14 days	45 Days	October 1 – May 15		$1,000/day

[1]Liquidated damages will be applied independently for each key contract date set forth by this Contract.
[2]Where the schedule requirements identified in this Section are not met, including repairs not fully complete, final cleaning, equipment reinstallation, and all other work to make the system suitable for Owner operation, non-quantifiable liquidated damages in the corresponding amounts will be applied.
[3]Time allowed until water line is reconnected and pressurized, and any finished water treatment storage tank or reservoir is filled, disinfected and put back into service.

Table 2 – WTP Reservoir Improvements Suggested Sequence of Work[1, 2]

Group	Phase	Item	Maximum Work Duration[3]	Liquidated Damages
A	Reservoir Unit 1 Out of Service	Vault 1 - FW 6306	5 days	$500/day
		Vault House - F W6316	5 days	$500/day
		Reservoir Unit 1 Work	45 days	$500/day
		Fill and Disinfect Unit 1	TBD	
B	Reservoir Unit 2 Out of Service	Vault House - FW6305	5 days	$500/day
		Reservoir Unit 2 Work	60 days	$500/day
		Overflow Piping Modifications		
		Install Cap on Unit 2 24-inch CW		
		Fill and Disinfect Unit 2	TBD	
C	No Reservoir Units Out of Service	Vault 3 - FW 6307	5 days	$500/day
		Unit 2 Cap Remains		
D	Reservoir Units 2 & 3 Out of Service	Vault 3 - FW 6314	5 days	$1500/day
		Vault 4 - FW 6315		
		Remove Cap from Unit 2 24-inch CW		
		Fill and Disinfect Unit 2		
E	No Reservoir Units Out of Service – Reservoir Gravity Service Isolated	Vault House – FW 6317	1 day	$500/day
F	Reservoir Unit 3 Out of Service	Vault 5 - FW 6318	5 days	$500/day
		Vault 4 - FW 6308	5 days	$500/day
		Reservoir Unit 3 Work	45 days	$500/day
		Fill and Disinfect Unit 3		

[1]Liquidated damages will be applied independently for each key contract date set forth by this Contract.
[2]Where the schedule requirements identified in this Section are not met, including repairs not fully complete, final cleaning, equipment reinstallation, and all other work to make the system suitable for Owner operation, non-quantifiable liquidated damages in the corresponding amounts will be applied.
[3]Time allowed until water line is reconnected and pressurized, and any finished water treatment storage tank or reservoir is filled, disinfected and put back into service.

1.6 PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a Preconstruction Conference and organizational meeting at the Site or other convenient location prior to commencement of construction activities to review responsibilities and personnel assignments.

B. Attendees: Owner, Engineer, Contractor, and its superintendent, manufacturers, suppliers, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:
1. Tentative Construction Schedule.
2. Critical Work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Distribution of Contract Documents.

7. Submittal of Shop Drawings, product data, and samples.
8. Preparation of Record Documents.
9. Use of the premises.
10. Office, Work, and storage areas.
11. Equipment deliveries and priorities.
12. Safety procedures.
13. First aid.
14. Security.
15. Housekeeping.
16. Working hours.

1.7 PROGRESS MEETINGS

A. Attendees: In addition to representatives of Owner and Engineer, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

B. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

C. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

D. Reporting: Engineer will prepare and distribute copies of minutes of the meeting to each party present and to other parties who should have been present. The minutes will include a brief summary, in narrative form, of progress since the previous meeting and report.

E. Schedule Updating: Contractor shall revise Construction Schedule after each progress meeting where revisions to Schedule have been made or recognized. Issue revised Schedule no later than 3 days after the progress meeting date to Engineer for distribution concurrently with the progress meeting minutes.

1.8 INSPECTIONS

A. Contractor shall participate in inspections with Owner and/or Engineer as needed throughout the project.

1.9 VALVE ISOLATION

A. Contractor shall coordinate the isolation of any valves to be replaced with the City.

B. City staff will operate existing valves to complete isolation for the valve to be replaced.

1.10 FINISHED WATER STORAGE TANK AND RESERVOIR SHUTDOWN

A. Contractor shall coordinate the shutdown of any finished water storage tank or reservoir or any portion thereof with the City.

B. City staff will isolate the system to shut down only one finished water storage tank or reservoir at a time.

C. Once work is complete Contractor to coordinate filling and disinfection and testing of the finished water storage tank or reservoir with the City staff prior to operation.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01 31 00

SECTION 01 32 16 – CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the preparation, furnishing, distribution and periodic revision of construction progress schedules.

PART 2 - PRODUCTS

2.1 FORM OF SCHEDULE

A. Preparation:
   1. Prepare in the form of a horizontal bar chart, CPM network, or other form as previously approved by Engineer.
   2. Provide a separate horizontal bar column or path for each trade or operation.
   3. Prepare the schedule in the chronological order of the beginning of each item of work.
   4. Identify each column or path by:
      a. Major Specification Section number.
      b. Distinct graphic delineation.
   5. Use a horizontal time scale and identify the first work day of each week.
   6. Allow space for updating.

B. Size: The schedule sheets shall be 11 inches x 17 inches unless otherwise approved by Engineer.

2.2 CONTENT OF SCHEDULES

A. Construction Sequence:
   1. Provide a complete sequence of construction by activity and Milestones.
   2. For Shop Drawings, project data and Samples indicate the following:
      a. Submittal dates.
      b. Dates review copies will be required.
   3. Show decision dates for selection of finishes.
   4. Show Product procurement and delivery dates.
   5. Show dates for beginning and completion of each element of construction.

B. Percentage Completion: Show the projected percentage of completion for each item of work as of the first day of each month.

C. Subschedules:
   1. Provide separate subschedules showing submittals, review times, procurement schedules and delivery days.
   2. Provide subschedules to define critical portions of the entire schedule.

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Preliminary Schedule:
   1. Submit the preliminary schedule within 10 days after the Effective Date of Agreement.
   2. Engineer will review schedules and will return the reviewed copy within 15 days after receipt.

3. If required, resubmit within 7 days after receipt of a returned review copy.
4. Meet with Engineer at least 10 days prior to the submission of the first Application for Payment to review the schedule.

B. Periodic Adjustment: Monthly, submit a revised schedule accurately depicting adjustments and progress to the first day of each month.

C. Number of Copies: Submit the number of copies required by Contractor, plus 4 copies to be retained by Engineer.

3.2 DISTRIBUTION

A. Reviewed Schedules: Distribute copies of the reviewed schedules to the following:
1. Job Site file.
2. Subcontractors.
3. Other concerned parties.

B. Instructions to Recipients: Instruct recipients to report all inability to comply with the schedule, and provide detailed explanations with suggested remedies.

3.3 ADJUSTMENT OF PROGRESS SCHEDULE

A. Changes: Show all changes occurring since previous submission of the schedule.

B. Progress: Indicate progress of each activity and show completion dates.

C. Other Items:
1. Include major changes in scope.
2. Include activities modified since previous updating.
3. Include revised projections due to changes.
4. Include other identifiable changes.

D. Narrative Report: Provide a narrative report including:
1. A discussion of problem areas including current and anticipated delay factors and their impact.
2. Direct action taken, or proposed, and its effect.
3. A description of revisions including:
   a. Their effect on the schedule due to change of scope.
   b. Revisions in duration of activities.
   c. Other changes that may affect the schedule.
4. The status of completion of Milestones.

END OF SECTION 01 32 16

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedures for the submittal of Shop Drawings, Product Data, Samples, Operation and Maintenance Manuals, and other information.

B. Related Sections include pertinent Sections of these Specifications for the individual Submittals required.

1.3 DEFINITIONS

A. Submittal: Information sent by Contractor to convey information about systems, equipment, materials, products, and administrative matters for the Work.

B. Resubmittal: Submittal sent for review a second or further time.

C. Product Data: Illustrations, standard schedules, diagrams, performance charts, instructions, brochures, or manufacturer's literature that describe the physical size, appearance, and other characteristics of materials or equipment for a portion of the Work.

D. Shop Drawings: Drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

E. Action Submittals: Submittals that require Engineer's response.

F. Informational Submittals: Submittals that do not require Engineer's response.

G. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format. All PDF files shall be searchable.

1.4 SUBMITTAL PROCEDURES

A. Submittal Schedule:
   1. Prepare and submit a Submittal schedule that identifies the following for each Submittal:
      a. Submittal number
      b. Submittal description
      c. Projected date Submittal will be submitted.
   2. An electronic copy (MS Excel file) of a blank Submittal schedule, in the preferred format, will be furnished by Engineer at the preconstruction meeting.
   3. Submittal Numbers:
      a. Use the applicable Specification Section number followed by a dash and then a sequential number (e.g., 06 10 00-1). Where a Submittal is required via a Drawing (instead of a Specification Section), use the applicable Drawing Number followed by a dash and then a sequential number (e.g., M501-1).
      b. Resubmittals shall include a letter suffix after another dash (e.g., 06 10 00-1-A).
      c. Submittals that are not numbered correctly may be rejected.

B. Delivery Method:
   1. Web-Based Collaboration and Document Sharing System:
      a. A web-based collaboration and document sharing system may be utilized at Contractor's, Owner's, or Engineer's option.
      b. Use of such a system will be discussed during the preconstruction meeting.
      c. All parties must agree on use of a web-based collaboration and document sharing system.
      d. Training and licensing will be provided for all parties by the party suggesting use of a web-based collaboration and document sharing system.
   2. Where a web-based collaboration and document sharing system is not utilized, Submittals may be delivered as paper copies or electronic files at Contractor's option; except for Operation and Maintenance Manuals, which shall be delivered as specified herein.
   3. Advise Engineer and Owner of delivery method to be used at the preconstruction meeting.
   4. Where Submittals include information that is intended to be printed on sheets larger than 11 inches x 17 inches, or where scale or drawing size are critical for proper review, submit 1 paper copy for review.
   5. Paper Copies:
      a. Unless indicated otherwise, submit 1 copy of each approved Submittal.
      b. Extra copies submitted by Contractor will be discarded.
   6. Electronic Files:
      a. Unless indicated otherwise, submit 1 copy of each Submittal in PDF format.
      b. Scanned Submittals shall be produced in such a way as to not compromise the graphic quality or accuracy of scale, where applicable; and text shall be searchable.
      c. One copy of each Action Submittal will be returned to Contractor.
      d. Transmit Submittals via electronic mail (e-mail) or web-based collaboration and document sharing system, where used. Submittals that are transmitted electronically will be returned electronically.
   7. Transmit Submittals to party and address identified by Engineer at preconstruction meeting.

C. Coordination and Timing: Coordinate preparation and processing of Submittals with performance of construction activities. Contractor is responsible for cost of delays caused by lack of coordination or tardiness of Submittals. Incomplete Submittals will be rejected.
   1. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of Submittals for related parts of the Work so processing will not be delayed because of need to review Submittals concurrently for coordination.
      a. Engineer reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

D. Processing Time: Allow 15 full working days for Engineer to review each Submittal, including Resubmittals. Time for review shall commence on Engineer's receipt of Submittal. No extension of the Contract Time will be authorized because of failure to transmit Submittals enough in advance of the Work to permit processing, including Resubmittals. Engineer will advise Contractor when a Submittal being processed must be delayed for coordination.

E. Identification: Place a permanent label on each Submittal or generate a separate cover sheet.
   1. Indicate name of firm or entity that prepared Submittal.
   2. Provide space to record Contractor's review and approval markings and action taken by Engineer.
   3. Include the following information:
      a. Project name.
      b. Date.
      c. Name and address of Engineer.
      d. Name and address of Contractor.
      e. Name and address of Subcontractor(s).
      f. Name and address of Supplier(s).
      g. Name of Manufacturer.
      h. Submittal number, including revision identifier.
      i. Drawing number and detail references, as applicable.
      j. Location(s) where product is to be installed, as applicable.
      k. Other necessary identification.

F. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on Submittals. Submittals that include deviations that are not identified may be rejected. Engineer may or may not consider deviations. Deviations are not substitutions.

G. Transmittal: Package each Submittal individually and appropriately for transmittal and handling. Transmit each Submittal using a transmittal form. Engineer will reject Submittal(s) received from sources other than Contractor.

H. Resubmittals: Make Resubmittals in same form and number of copies as initial Submittal.
   1. Note date and content of previous Submittal.
   2. Clearly identify additions and revisions.
   3. Resubmit Submittals until they are marked, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

I. Distribution: Furnish copies of Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted,” to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

J. Use for Construction: Unless otherwise indicated by Engineer, use only Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

1.5 CONTRACTOR'S USE OF ENGINEER’S ELECTRONIC DRAWING FILES

A. At Contractor's written request, copies of Engineer’s electronic Drawing files may be provided to Contractor for Contractor's use in connection with Project, including Submittal preparation. Electronic files may be furnished by Engineer for the convenience of the Contractor. Conclusions or information obtained or derived from such electronic files will be at the Contractor’s sole risk. Materials furnished by Engineer that may be relied upon are limited to printed Contract Documents.

B. When Contractor uses Engineer’s electronic Drawing files to facilitate Submittal preparation, prepare Submittals to be project specific. Submittals that are not project specific, including Engineer’s Drawing files submitted on a new title block, will be rejected.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit project specific Action Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.

B. Product Data: Collect information into a single Submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for Submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each Submittal to indicate which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's written recommendations.
      b. Manufacturer's product specifications.
      c. Manufacturer's installation instructions.
      d. Color charts as required by individual Specification Sections.
      e. Manufacturer's catalog cuts.
      f. Wiring diagrams showing factory-installed wiring.
      g. Printed performance curves.
      h. Operational range diagrams.
      i. Mill reports.
      j. Standard product operation and maintenance manuals.
      k. Compliance with specified referenced standards.
      l. Testing by recognized testing agency.
      m. Application of testing agency labels and seals.
      n. Notation of coordination requirements.
   4. Submit Product Data before or concurrent with Samples.
   5. Maintain copy of returned Submittal for Project records.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale where appropriate. Scale shall be sufficiently large to indicate pertinent features of the item and its method of connection to the Work.
   1. Preparation: Fully illustrate requirements of the Contract Documents. Include the following information, as applicable:
      a. Dimensions.
      b. Identification of products.
      c. Fabrication and installation drawings.
      d. Colors and materials as applicable.
      e. Roughing-in and setting diagrams.
      f. Wiring diagrams showing field-installed wiring, including power, signal, control, and communication wiring. Differentiate between Manufacturer-installed and field-installed wiring.
      g. Manufacturing instructions.
      h. Templates and patterns.
      i. Schedules.
      j. Calculations.
      k. Compliance with specified standards.
      l. Notation of coordination requirements.
      m. Notation of dimensions established by field measurement.
      n. Relationship to adjoining construction clearly indicated.
   2. Sheet Size: Submit Shop Drawings on sheets at least 8-1/2 inches x 11 inches but no larger than 24 inches x 36 inches.
   3. Maintain copy of returned Submittal for Project records.

D. Operation and Maintenance Manuals:
   1. General:
      a. Where manuals are required to be submitted covering items included in the Work, prepare such manuals in durable plastic binders approximately 8-1/2 inches x 11 inches in size and with at least the following:
         1) Identification on, or readable through, the front cover stating general nature of the manual.
         2) Include a table of contents or index with each Submittal, near the front of the manual. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.
         3) Complete instructions regarding operation and maintenance of equipment involved, including:
            a) Equipment function, normal operating characteristics, and limiting conditions.
            b) Assembly, installation, alignment, adjustment, and checking instructions.
            c) Operating instructions for start-up, routine and normal operating, regulation and control, shutdown, and emergency conditions.
            d) Maintenance instructions, including lubrication requirements where applicable.
            e) Guide to "troubleshooting".
            f) Parts lists and predicted life of parts subject to wear.
            g) Project specific outline and cross sections, assembly drawings, engineering data, and wiring diagrams. Wiring diagrams shall reflect final, as-installed conditions and include wire numbers.
            h) Test data and performance curves.
         4) Complete nomenclature of all replaceable parts, their part numbers, current costs, and name and address of nearest vendor of parts.
         5) Copies of guarantees and warranties issued.
         6) Copies of the reviewed Submittals.
         7) Copies of data concerning changes made during construction.
   2. Extraneous Data: Where contents of the manuals include Manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete all Manufacturers' data with which this installation is not concerned. Do not use highlighting that would not be reproducible.
   3. Number of Copies Required: Unless otherwise specifically directed by Engineer, or stipulated in the pertinent Section of these Specifications:
      a. For review, submit 1 paper and 1 electronic copy.
      b. For record, deliver 4 paper and 1 electronic copies to Engineer.
   4. Schedule delivery of record copies of operation and maintenance manuals at least 14 days prior to startup of respective equipment, unless otherwise specified.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.

B. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

D. Installer Certificates: Prepare written statements on Manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by Manufacturer for this Project.

E. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

F. Manufacturer's Instructions: Prepare written or published information that documents Manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of Manufacturer. Include the following, as applicable:
   1. Preparation of substrates.
   2. Required substrate tolerances.
   3. Sequence of installation or erection.
   4. Required installation tolerances.
   5. Required adjustments.
   6. Recommendations for cleaning and protection.

G. Manufacturer's Field Reports: Prepare written information documenting tests and inspections of factory-authorized service representative. Include the following, as applicable:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement of substrate condition and acceptability of substrate for installation or application of product.
   3. Statement that products at Site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Document settings in writing.
   8. Other required items indicated in individual Specification Sections.

H. Record Photographs:
   1. Contractor shall take a minimum of 10 preconstruction photographs to document the condition of each site prior to beginning work.
   2. After final acceptance of the Work, 10 photographs shall be taken of each structure and major feature of the Project as directed by Engineer. These photographs shall be taken from points and at times directed by Engineer.
   3. Photographs shall include condition of the Water Treatment Plant work areas, each reservoir or tank site, and pavement at each site, both before and after Project.
   4. Contractor shall provide digital photos submitted on flash or hard drive. File names should represent the subject matter of the photo.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each Submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Verify field dimensions and conditions; note corrections as necessary. Mark with approval stamp before submitting to Engineer.
   1. Approval Stamp: Stamp each Submittal with an approval stamp. Use the same stamp format for each Submittal. Include Project name and location, Submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that Submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

B. Submittals that are not approved and stamped by Contractor will be rejected.

3.2 ENGINEER'S REVIEW

A. Action Submittals: Engineer will review Action Submittals, make marks to indicate corrections or modifications required, and return Submittal. Engineer will stamp each Submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
   1. Reviewed, No Exceptions Noted: Submittal appears to conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   2. Reviewed With Corrections Noted: Upon incorporation of review comments, it appears that Submittal will conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   3. Revise and Resubmit: Submittal has one or more specific segments that are incomplete, do not appear to conform to the information given in the Contract Documents, or are incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Except as noted, Contractor shall not proceed with Work related to Submittal.
   4. Rejected, Resubmit: Submittal as a whole is incomplete, does not appear to conform to the information given in the Contract Documents, or is incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Contractor shall not proceed with Work related to Submittal.

B. Informational Submittals: Other Submittals required by the Contract Documents are for information only. Engineer will acknowledge receipt of Informational Submittals. Such Submittals include, but are not limited to:
   1. Qualifications Data.
   2. Certificates.
   3. Test Reports.
   4. Manufacturer's Instructions.
   5. Maintenance Data.
   6. Field Reports.

C. Delegated-Design Submittals: Review of Delegated-Design Submittals by Engineer shall not relieve Contractor of Contractor's sole responsibility for design and achieving specified performance.

D. Submittals not required by the Contract Documents will be returned without being reviewed.

E. Partial Submittals are not acceptable, will be considered non-responsive, and will be rejected.

END OF SECTION 01 33 00

SECTION 01 41 00 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for requirements and fees of regulatory agencies.

B. Related Sections include permits and licenses indicated in other Sections.

C. The General Conditions requires that Contractor obtain and pay for all construction permits. This Section includes provisions for specific permits but does not include all permits.

1.3 PERMITS

A. Owner has applied for and will obtain the following permits:
   1. Water System Construction (Act 399, P.A. 1976):
      a. Agency: EGLE.
      b. Permit No.: TBD
      c. Application Date: May 25, 2022.

B. Permit Compliances:
   1. Ensure that permit has been issued prior to beginning the Work.
   2. Comply with requirements of permits.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 41 00

SECTION 01 45 34 – SPECIAL INSPECTIONS AND TESTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for special inspections as follows and includes the Statement of Special Inspections.
   1. Special inspections of structures.

B. Special inspection services for which Owner will contract and pay directly and will be performed by a special inspector or inspectors selected by Owner:
   1. Steel construction.
   2. Concrete construction.
   3. Soils.
   4. Travel expense of the special inspector.

C. Testing, special inspections and certifications which are not included in the above, but shall be included in the Contractor's Base Bid:
   1. Inspections and tests required by codes or ordinances or by an authority having jurisdiction and made by a legally constituted authority.
   2. Inspections, testing services and certifications including, but not limited to, the following:
      a. Pipe leakage tests.
      b. Tank leakage tests.
      c. Manufacturer's certificate of compliance for weld filler metal.
      d. Manufacturers' certification tests for cement.
      e. Supplier's certification tests for fine and coarse aggregate.
      f. Aggregate alkali reactivity testing.
      g. Testing in connection with the Engineer's review of materials and equipment proposed by Contractor to be incorporated into the Work.
      h. Testing performed for the Contractor's convenience.

D. Owner Paid Items: Owner may elect to inspect or to employ either Engineer or a special inspector to inspect materials or systems on the Project other than those specified herein. The cost of this inspection will be paid for by Owner.

E. Special inspection services are required to verify compliance with the Contract Documents and with the requirements of the Building Code. These services do not relieve Contractor of responsibility for verification of compliance with Contract Document requirements.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ACI - American Concrete Institute:
      a. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
      b. 301 - Specification for Structural Concrete.
      c. 318 - Building Code Requirements for Reinforced Concrete.
   2. AISC – Steel Construction Manual.
   3. ASTM Standards:
      a. C31 - Practice for Making and Curing Concrete Test Specimens in the Field.
      b. C33 - Specification for Concrete Aggregates Including Appendix XI.
      c. C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
      d. C42 - Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

e. C138 - Test Method for Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete.
f. C143 - Test Method for Slump of Hydraulic-Cement Concrete.
g. C157 - Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
h. C172 - Practice for Sampling Freshly Mixed Concrete.
i. C173 - Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
j. C192 - Practice for Making and Curing Concrete Test Specimens in the Laboratory.
k. C231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
l. C295 - Guide for Petrographic Examination of Aggregates for Concrete.
m. D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
n. D1556 - Test Method for Density and Unit Weight of Soil In Place by Sand-Cone Method.
o. D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
p. D1586 - Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils.
q. D2166 - Test Method for Unconfined Compressive Strength of Cohesive Soil.
r. D2167 - Test Method for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
s. D2937 - Test Method for Density of Soil in Place by Drive-Cylinder Method.
t. D6938 - Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

4. Michigan Building Code.
5. MDOT:
   a. Standard Specifications for Construction.
   b. Density Testing and Inspection Manual.

1.4 DEFINITIONS

A. Terms:
1. Building Code: The building code plus amendments, if any, legally adopted for the location in which the Project is located.
2. Special Inspection: Inspection and testing as herein required of materials, installation, fabrication, erection or placement of components and connections requiring special expertise of one or more approved special inspectors in order to ensure compliance with the Building Code and the Contract Documents.
3. Testing Agency; Independent Testing Agency: Special inspector.

1.5 PERFORMANCE REQUIREMENTS

A. Special Inspector Qualifications:
1. Qualified in accordance with the Building Code and by local building official.
2. Objective, competent and independent from the contractor performing the work to be inspected.
3. Familiar with Building Code requirements for special inspections.
4. Having adequate equipment, periodically calibrated as required, to perform the special inspections.
5. Employing experienced personnel educated in conducting, supervising and evaluating special inspections similar in complexity to that required for the Project.
6. Submission of Qualifications:
   a. Special inspector shall provide to the building official written documentation as required to demonstrate competence, objectivity and experience or training.
   b. Disclose possible conflicts of interest.

B. Perform special inspections in accordance with:
1. Laws and Regulations.
2. Reference procedures and requirements.
3. Building Code.
4. Contract Documents.
5. Manufacturer’s requirements, as applicable.
6. Reviewed submittals for the Project, as applicable.

C. Testing Outside a Structure Footprint: In accordance with Division 01 Section “Testing for Buried Utilities, Roadways, and Site Projects.”

1.6 REINSPECTION COSTS

A. Reinspection:
   1. When initial special inspections of items except soil compaction indicate noncompliance with the Contract Documents, subsequent special inspections occasioned by the noncompliance shall be performed by the same special inspection agency, and the costs thereof will be deducted by the Owner from the Contract Sum.
   2. Soil Compaction:
      a. The first retesting of soil compaction shall be paid for in accordance with the provisions of the Contract Documents.
      b. The second and subsequent retesting for soil compaction due to noncompliance with the Contract Documents shall be performed by the same special inspection agency, and the costs thereof will be deducted by the Owner from the Contract Sum.

B. Uncovering Costs: Paid for as described in the General Conditions.

1.7 REPORTS AND SUBMISSIONS

A. Special Inspection Reports:
   1. Special inspector shall keep records of special inspections in accordance with the Building Code.
   2. Records shall indicate that work inspected was or was not completed in conformance with the Contract Documents.
   3. Report and reinspect non-conformances until they are in conformance with the Contract Documents.
   4. Final Report:
      a. Prepare and submit a final report at the completion of the special inspections.
      b. Document the completion of specified special inspections and correction of discrepancies.
      c. Submit as specified for inspection reports.
   5. Provide typed electronic copies of reports to:
      a. Owner.
      b. Engineer.
      c. Contractor.
      d. Building official.
   6. Discrepancies: Bring to immediate attention of Contractor, and, if not corrected, to attention of Engineer and building official.

1.8 SCHEDULES FOR SPECIAL INSPECTIONS

A. Establishing Schedule: By advance discussion between special inspector and Contractor, determine the time required to perform special inspection and to issue findings.

B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate such changes of schedule with the special inspector.

C. Adherence to Schedule: When the special inspector is ready according to the determined schedule, but is prevented from performing special inspection due to incompleteness of the Work, extra costs attributable to the delay may be charged to Contractor and shall not be borne by Owner.

1.9 CONTRACTOR'S DUTIES

A. Cooperate with Special Inspector:
   1. Schedule the Work so that special inspector is allowed a reasonable schedule and amount of time to access and view the components requiring special inspection before being obscured by subsequent construction.
   2. Notify special inspector 24 hours minimum prior to expected time when special inspection services will be required.
   3. Provide the following as necessary for special inspector to properly perform its functions:
      a. Access to the Work.
      b. Facilities for access to the Work.
      c. Tools.
      d. Storage.
      e. Assistance as requested.

B. Submission of Written Statements:
   1. To be submitted by each contractor responsible for construction of a main wind or seismic force resisting system, designated seismic system or a wind or seismic resisting component listed in the Statement of Special Inspections.
      a. Submit to building official, Owner, and Engineer, prior to commencement of construction on the respective system or component.
      b. Acknowledging awareness of the special inspections specified herein.
   2. Each fabricator, at the completion of their respective fabrication, shall submit a certificate of compliance to the building official and Engineer stating that the fabrication was performed in accordance with the Contract Documents.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 STATEMENT OF SPECIAL INSPECTIONS

A. Frequency of Special Inspections:
   1. The minimum frequency of the special inspections (periodic vs. continuous) shall be as indicated in the Building Code.
   2. Quality assurance inspections performed in accordance with standards referenced herein shall conform to the frequency requirements indicated in those standards.

B. Steel Construction:
   1. Inspect and verify structural steel in accordance with the quality assurance requirements of AISC 360 and the Contract Documents.

C. Concrete Construction:
   1. Special Inspections:
      a. Perform special inspections in accordance with Table 1705.3 of the Building Code and this Specification for all concrete.
      b. Inspect and verify:
         1) Reinforcing steel and placement.
         2) Waterstop Joint Construction: Continuity of waterstops; tying PVC waterstops in position; cleanliness of joints prior to concrete placement.
         3) Anchor rods prior to and during placing of concrete.
         4) Anchors post-installed in hardened concrete.
         5) Proper use of required design mix.
         6) Proper placement of concrete.
         7) Maintenance of specified curing techniques and temperatures.
         8) For elevated structural slabs, in place concrete strengths prior to removal of forms and placement of reshores, if any.
         9) Concrete formwork for proper shape, location and dimension.
   2. Concrete Material Testing:
      a. Perform material testing in accordance with Table 1705.3 of the Building Code and this Specification for all concrete.
      b. Point of sampling and the method of securing the Samples:
         1) Determined by special inspector.
         2) In accordance with ASTM C172.
      c. Slump Tests:
         1) Perform slump tests in accordance with ASTM C143.
         2) Perform one slump test on the Site for each 10 cubic yards of concrete.
         3) At Engineer's request, also perform slump tests at batch plant before adding water reducer.
         4) Perform more slump tests if deemed necessary by Engineer.
      d. Perform 1 air-entraining test in accordance with ASTM C231 or C173 for each truckload or every 10 yards of concrete placed, whichever is more frequent.
      e. Test the concrete unit weight in accordance with ASTM C138 or C567, as applicable.
      f. Test the air content and fresh concrete temperature of each set of concrete cylinders.

g. Concrete Cylinder Testing:
   1) In accordance with ASTM C31 and C39.
   2) Take concrete cylinder Samples as follows:
      a) Once each day a given class of concrete is placed, nor less than
      b) Once for each 150 cubic yards (or fraction thereof) of each class of concrete placed each day, nor less than
      c) Once for each 5,000 square feet of slab or wall surface area placed each day.
   3) Concrete cylinder Sample shall consist of a minimum of 4 cylinders.
      a) Make standard 6x12 cylinders, except that for concrete mixes with 1-inch or smaller coarse aggregate, 4x8 cylinders may be used.
      b) Contractor shall be responsible for having additional pairs of cylinders taken and tested, if required to demonstrate adequate concrete strengths at ages earlier than 28 days if Contractor's schedule requires form removal from load-bearing concrete prior to 28 days.
   4) Handle cylinders carefully.
   5) On Site Storage:
      a) 12 hours, minimum, 48 hours maximum.
      b) At a temperature range of 60 to 80 degrees F and in a moist environment.
      c) Shielded from direct sunlight and radiant heat.
      d) The Contractor shall construct heated or water bath enclosures, as applicable, if conditions require.
      e) Cylinders Samples taken to establish adequate strength for form removal earlier than 28-days shall be cured in locations that represent the conditions under which the structural concrete will be cured.
   6) Laboratory Curing:
      a) For duration of curing after on Site storage.
      b) Does not include cylinders taken to establish adequate strength for form removal earlier than 28-days.
   7) Test 1 of the cylinders at 7 days and 2 cylinders at 28 days. Save 1 cylinder as a spare.
   8) Acceptance and evaluation of the concrete shall be based on ACI 301.

D. Concrete Repair Materials:
   1. Test materials as indicated in Division 03 Section "Rehabilitation of Cast-in-Place Concrete."

E. Soils:
   1. Inspect and verify in accordance with Table 1705.6 of the Building Code and this Specification.
   2. Inspect and verify:
      a. Excavations are extended to proper depth and reached proper material.
      b. Classification of structure fill and backfill material.
      c. Classification of utility backfill material.
      d. Use of proper fill and backfill materials, lift thicknesses and compaction.
      e. Prior to placement of fill, subgrade material and preparation, and subgrade compaction.

END OF SECTION 01 45 34

SECTION 01 45 35 – TESTING SERVICES FOR BURIED UTILITIES, ROADWAYS, AND SITE PROJECTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes testing services as follows:
   1. Testing services which the Contractor shall pay for as part of the Contractor's base Bid and will be performed by a testing agency selected by the Contractor:
      a. Fill material from onsite and offsite.
      b. Fine and coarse aggregate certification tests.
      c. Bedding material certification tests.
      d. Laboratory soil proctor tests.
      e. Soil compaction tests.
      f. Verification of soil bearing capacity.
      g. Base and subbase compaction tests.
      h. Collecting and transporting soil samples to the independent testing agency's laboratory.
      i. Laboratory soil proctor tests.
      j. Concrete slump and air entrainment tests.
      k. Concrete cylinder compressive strength tests.
      l. Travel expense of the independent testing agency.
      m. Making concrete cylinders.
      n. Transporting cylinders to testing agency's laboratory and performing tests.
   2. Testing services and certifications will not be contracted and paid for directly by Owner and should be included in the Contractor's base Bid:
      a. Pipe leakage and pressure tests.
      b. Pipe material tests.
      c. Testing performed for the Contractor's convenience.
   3. Owner Paid Items:
      a. The Owner may elect to inspect or test or to employ either the Engineer or an independent testing agency to test materials on the Project other than those specified herein.
      b. The cost of this testing will be paid for by the Owner.

B. Testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for verification of compliance with Contract Document requirements.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. AASHTO:
      a. Provisional Standard - TP 23 Standard Test Method for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.
   2. ASTM Specifications, Tests and Test Methods:
      a. C31 - Making and Curing Concrete Test Specimens in the Field.
      b. C33 - Specification for Concrete Aggregates Including Appendix XI.
      c. C39 - Test for Compressive Strength of Cylindrical Concrete Specimens.
      d. C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
      e. C138 - Test for Unit Weight, Yield and Air Content of Concrete.
      f. C143 - Test for Slump of Portland Cement Concrete.
      g. C172 - Sampling Fresh Concrete.
      h. C173 - Test for Air Content of Freshly Mixed Concrete by the Volumetric Method.
      i. C192 - Making and Curing Concrete Test Specimens in the Laboratory.
      j. C227 - Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method).

k. C231 - Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
l. C289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
m. C295 - Standard Guide for Petrographic Examination of Aggregates for Concrete.
n. C567 - Unit Weight of Structural Lightweight Concrete.
o. C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
p. D698 - Laboratory Compaction Characteristics of Soil Using Standard Effort.
q. D1556 - Density of Soil In Place by the Sand-Cone Method.
r. D1557 - Moisture-Density Relations of Soils and Soils Aggregate Mixture Using 10 Pound Rammer and 18-Inch Drop.
s. D1586 - Penetration Test and Split Barrel Sampling of Soils.
t. D1883 - CBR (California Bearing Ratio) of Laboratory Compacted Soils.
u. D2166 - Unconfined Compressive Strength of Cohesive Soil.
v. D2167 - Density of Unit Weight of Soil In Place by the Rubber Balloon Method.
w. D2922 - Density of Soil and Soil Aggregates by Nuclear Methods.
x. D2937 - Density of Soil in Place by Drive Cylinder Method.
y. D3740 - Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as used in Engineering Design and Construction.

3. ACI - American Concrete Institute:
   a. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
   b. 211.1R - Report on Alkali-Aggregate Reactivity.
   c. 301 - Specification for Structural Concrete for Buildings.
   d. 318 - Building Code Requirements for Reinforced Concrete.
4. MDOT Standards: Michigan Cone Test for Determination of Maximum Unit Weight of Granular Soils.

1.4 TEST REQUIREMENTS

A. In accordance with:
   1. Laws and Regulations.
   2. Sections of these Specifications.
   3. Reference procedures and requirements.
   4. Pertinent standards for testing.

B. Testing Agency Qualifications:
   1. Approved by authorities having jurisdiction.
   2. Agency whose primary business is materials and construction testing.
   3. Approved by the Engineer or the Owner.
   4. Objective, competent and independent from the Contractor performing the work to be inspected.
   5. Having adequate equipment, periodically calibrated as required, to perform the special inspections.
   6. Employing experienced personnel educated in conducting, supervising and evaluating special inspections similar in complexity to that required for the Project.

1.5 RETESTING COSTS

A. Retesting:
   1. When initial special inspections of items except soil compaction indicate noncompliance with the Contract Documents, subsequent special inspections occasioned by the noncompliance shall be performed by the same special inspection agency, and the costs thereof will not be reimbursed.
   2. Soil Compaction:
      a. The first retesting of soil compaction shall be paid for in accordance with the provisions of the Contract Documents.
      b. The second and subsequent retesting for soil compaction due to noncompliance with the Contract Documents shall be performed by the same special inspection agency, and the costs thereof will not be reimbursed.

1.6 REPORTS

A. Provide the Engineer’s field representative and Contractor’s superintendent with a draft copy of the daily report prior to leaving the Project Site each day on which testing is performed on the Site.

B. Provide typed copies of testing agency reports, inspections, and certifications within 5 business days to:
   1. The Engineer's Office: One copy.
   2. The Contractor's Office: One copy.

1.7 SCHEDULING TESTING

A. Coordinate and schedule the work of the independent testing agency.
   1. Notify the Engineer and the independent testing agency 48 hours prior to the expected time when testing services will be required.
   2. Provide access to the Work as necessary for the agency to properly perform its functions.

B. Establishing Schedule: By advance discussion with the Engineer and independent testing agency, determine the time required to perform tests and to issue findings.

C. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the independent testing agency as required.

D. Adherence to Schedule: When the independent testing agency is ready to test according to the determined schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributable to the delay will be paid by the Contractor.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 TESTING REQUIREMENTS

A. Fine and Coarse Aggregate and Bedding Material:
   1. Sieve test to ensure compliance with the materials specifications.
   2. Provide 1 test for each source of imported materials as directed by the Engineer.

B. Fill Material from Onsite and Offsite Sources: Sieve test to ensure compliance with the materials specifications.

C. Soil Compaction:
   1. Minimum Frequency of Testing:
      a. Within the Building Footprint: See Division 01 Section “Special Inspections and Tests.”
      b. Outside a Building Footprint: One test per 5,000 square feet of subgrade for each layer of fill.
      c. Utility Trenches: One test for every 200 linear feet of trench length at each lift.
      d. Utility Structures: One test under each manhole, vault or other structure.
      e. Curb and Gutter: One test for every 100 linear feet.
      f. Pavement Subgrade, Base Grade:
         1) One test for every 2,500 square feet for road construction.
         2) One test at every driveway or curb cut location.
         3) One test for every 500 square feet for road intersections.
   2. Predominately Granular Soils:
      a. Perform necessary laboratory and field testing required to verify compaction of fill, bedding, trench backfill and structure backfill in accordance with ASTM D1557 or Michigan Cone.
      b. Verify the compaction of the first 12 inches of the existing subgrade below structures, utility structures, paved areas, and areas to be filled in accordance with ASTM D1557 or Michigan Cone.
   3. Predominately Cohesive Soils:
      a. Perform necessary laboratory and field testing required to verify compaction of fill trench backfill and structure backfill in accordance with ASTM D698.
      b. Verify the compaction of the first 12 inches of the existing subgrade below structures, utility structures, paved areas, and areas to be filled in accordance with ASTM D698.
   4. Independent testing agency shall inform the Engineer and the Contractor's onsite supervisor immediately of onsite test results.
   5. Place no additional fill in areas where compaction results do not meet Specification requirements.

D. Concrete Testing:
   1. Point of sampling and the method of securing the Samples:
      a. Determined by the independent testing agency.
      b. In accordance with ASTM C172.
   2. Slump Tests:
      a. Perform slump tests in accordance with ASTM C143.
      b. Perform 1 slump test on the Site for each truckload of concrete.
      c. At the Engineer's request, also perform slump tests at batch plant before adding water reducer.
      d. Perform more slump tests if deemed necessary by the Engineer.
   3. Perform 1 air-entraining test in accordance with ASTM C231 or C173 for each truckload of concrete.
   4. Test the concrete unit weight in accordance with ASTM C138 or C567, as applicable.
   5. Test the air content and fresh concrete temperature of each set of concrete cylinders.
   6. Concrete Cylinder Testing:
      a. In accordance with ASTM C31 and C39.
      b. Take concrete cylinder Sample set as follows:
         1) Once for each 150 cubic yards (or fraction thereof) of each class of concrete placed each day, nor less than.
         2) Once for each 2,500 square feet of sidewalk or paving surface area placed each day.
      c. Concrete Cylinder Sample Set: Consist of 4 standard 6-inch cylinders.
      d. Handle cylinders carefully.
      e. Onsite Storage:
         1) Handle cylinders carefully.
         2) 12 hours, minimum, 48 hours maximum.
         3) Store at a temperature range of 60 to 80 degrees F and in a moist environment.
         4) Shield from direct sunlight and radiant heat.
         5) Construct heated or water bath enclosures, as applicable, if conditions require.
         6) Cylinder samples taken to establish adequate strength for form removal earlier than 28 days shall be cured in locations that represent the conditions under which the structural concrete will be cured.
      f. Laboratory Curing: For duration of curing after onsite storage.
      g. Test 1 of the cylinders at 7 days and 2 cylinders at 28 days. Save 1 cylinder as a spare.
      h. Acceptance and evaluation of the concrete shall be based on ACI 301.

END OF SECTION 01 45 35

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of construction facilities as follows:
   1. Temporary Utilities: Water.
   2. Sanitary facilities.
   3. Enclosures such as tarpaulins, barricades and canopies.
   4. Storage areas.

1.3 STORAGE AREAS

A. Locations:
   1. The following general areas are available for storage:
      a. Areas indicated on Drawings around Water Treatment Plant.
   2. Specific storage locations within the general areas:
      a. Carefully coordinate with Owner.
      b. Subject to approval of Owner.
   3. Contractor shall not block access to the thickeners, treatment basins, or other areas designated by the Owner.

B. Protection and Restoration:
   1. Take reasonable means to prevent spillage of fuel, oil, chemicals and similar materials.
   2. Clean up spills and, if necessary, remove soil and replace with uncontaminated soil so as to allow vegetation to be quickly reestablished.

C. Cleaning: Keep storage areas clean in accordance with Division 01 Section “Cleaning and Waste Management.”

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
   1. New or used.
   2. Adequate in capacity for the required usage.
   3. Provide safe conditions.
   4. Comply with requirements of applicable codes and standards.

2.2 UTILITIES

A. Temporary Utilities:
   1. Equipment Testing:
      a. Furnish, install, remove and pay for associated temporary equipment, piping, pumps, fuel, power distribution, and connections.
   2. Water:
      a. Furnish, install, remove and pay for all temporary piping, water meters, equipment and connections.
      b. Obtain water by connection to Owner's existing water system.

2.3 SANITARY FACILITIES

A. Furnish and install required sanitary facilities, including temporary toilet buildings with sanitary toilets and hand washing facilities or hand sanitizing stations, for use of workers; comply with minimum requirements of the Health Department or other public agency having jurisdiction; maintain in a sanitary condition at all times.

2.4 OTHER TEMPORARY CONSTRUCTION FACILITIES

A. Furnish, install and maintain all other temporary construction facilities necessary for proper completion of the Work.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with applicable requirements specified in: Local Building Code.

B. Maintain and operate systems to ensure continuous service.

C. Modify and extend systems as Work progress requires.

3.2 TEMPORARY CONTROLS

A. Traffic Control:
   1. Provide adequate barricades and take all necessary precautions for the protection of the Work, and the safety of the WTP staff.
   2. Maintain access for all WTP operations, deliveries, and normal activity for the duration of the Work.

3.3 REMOVAL

A. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

END OF SECTION 01 50 00

SECTION 01 73 29 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for cutting and patching work.

B. Requirements:
   1. Execute cutting, including excavating and filling, or patching of work required to:
      a. Make several parts fit properly.
      b. Uncover work to provide for installation of ill-timed work.
      c. Remove and replace defective work.
      d. Remove and replace work not conforming to the requirements of the Contract Documents.
      e. Install specified work in existing construction.

C. Protection of Work:
   1. Do not endanger any work by cutting or altering the work or any part of it.
   2. Do not cut or alter the work of another trade without written consent of Engineer.

1.3 SUBMITTALS

A. Written Notice:
   1. Prior to cutting which may affect the structural integrity of the Project or the work of another trade, submit written notice to Engineer requesting consent to proceed with cutting.
   2. Required Information:
      a. Identification of Project.
      b. Description of all related defective work.
      c. Necessity for cutting.
      d. Effect on other work or on the structural integrity of the Project.
      e. Description of the proposed work including:
         1) Scope of cutting and patching.
         2) Subcontractor and trades to execute work.
         3) Products proposed to be used.
         4) Extent of refinishing.

B. Changes of Materials or Methods:
   1. Should conditions of the Work, or the schedule, indicate change of materials or methods, submit a written recommendation to Engineer including:
      a. Conditions indicating the change.
      b. Recommendations for alternative materials or methods.
      c. Submittals as required for substitutions.

C. Uncovered Work: Submit written notice to Engineer designating the time work will be uncovered to provide for observation.

1.4 DIVISION OF WORK

A. Work:
   1. In accordance with the General Conditions, Contractor is responsible for dividing the Work among the Subcontractors and Suppliers and for delineating the work to be performed by specific trades.

2. The following are suggestions as to how the Work may be divided. This is not a complete list of all the Work:
   a. Each trade shall be financially responsible for all cutting and patching for sleeves, penetrations and installation of isolated components as necessary for its work unless herein specifically stated to the contrary.
   b. All patching shall be done by the trade whose work is damaged.
   c. Any cost caused by defective or ill-timed work shall be borne by the party responsible.
   d. Each trade shall do all fitting of its own work as required to make its several components fit together or to receive the work of other contractors.
   e. Holes cut in exterior walls or roofs for installation of mechanical or electrical equipment shall be waterproofed. If existing roofing is to remain, obtain and submit to Owner original roofing manufacturer's approval and warranty on new roof penetrations and where removing existing roof penetrations and curbs.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials and workmanship shall conform to the requirements of other Sections of the Specifications. Where no materials are specified in these specifications, use materials of an equivalent type, quality, and size to match those existing in other areas of the facility. If none exist, use materials and workmanship recognized as of the highest quality in the industry. Obtain Engineer's review of all such material and workmanship.

PART 3 - EXECUTION

3.1 INSPECTION

A. Existing Conditions: Inspect existing conditions of the Work, including elements subject to movement or damage during cutting and patching or excavating and backfilling.

B. Uncovered Work: After uncovering work, inspect conditions affecting the installation of new Products.

3.2 PREPARATION

A. Shoring and Bracing: Provide shoring, bracing and support as required to maintain structural integrity of the Project.

B. Protection: Provide protection for other portions of the Project and provide protection from the elements.

3.3 PERFORMANCE

A. Adjustments to Products: Execute fitting and adjustments of Products to provide finished installation.

B. Refinishing:
   1. Prepare existing surfaces for finishes by scraping, sanding, filling, acid etching, and sand blasting to ensure bonding and a smooth finish.
   2. Refinish entire surfaces as necessary to provide an even finish.
   3. Refinish continuous surfaces to the nearest intersection.
   4. Refinish entire assemblies.

3.4 CLEANING

A. Clean materials installed under this Section in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 01 73 29

SECTION 01 74 00 – CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for maintaining structures and the Site in a standard of cleanliness.

B. Related Sections: In addition to standards described in this Section, comply with requirements for cleaning as described in various other Sections of these Specifications.

1.3 QUALITY ASSURANCE

A. Inspection:
   1. Daily and more often if necessary.
   2. Conduct inspections to verify that requirements of cleanliness are being met.

1.4 DELIVERY, STORAGE AND HANDLING

A. Hazards Control:
   1. Volatile Wastes:
      a. Store in covered metal containers.
      b. Remove from premises daily.
      c. Provide secondary containment for storage of hazardous materials, as required by governing authorities or agencies.
   2. Prevent accumulation of wastes which create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.

1.5 PROJECT CONDITIONS

A. Cleaning and Disposal:
   1. Conduct operations to comply with local ordinances and anti-pollution laws.
   2. Not Allowed:
      a. Burning or burying of rubbish or waste materials on Site.
      b. Disposal of volatile wastes in storm or sanitary sewers: Volatile wastes include, but are not limited to, mineral spirits, oil or paint thinner.
      c. Disposal of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Compatibility:
   1. Compatible with the surface being cleaned.
   2. Recommended by the Manufacturer of the material being cleaned.
   3. As reviewed by Engineer.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. General:
1. Store Materials:
a. In an orderly arrangement allowing maximum access.
b. To allow unimpeded drainage and traffic.
c. Provide for the required protection of materials.
2. Do not allow accumulation of scrap, debris, waste material and other items not required for construction of the Work.
.
a. Remove from Site at least each week and more often if necessary.
b. Provide adequate storage for materials awaiting removal.
3. Observe requirements for fire protection and protection of the environment.

B. Site:
1. Daily, and more often if necessary:
a. Inspect the Site.
b. Pick up scrap, debris and waste material; remove such items to the place designated for their storage.
2. Weekly, and more often if necessary:
a. Inspect arrangements of materials stored on Site.
b. Restack or otherwise service arrangements to meet the requirements of paragraph 3.1.A.1 above.
3. At all times maintain the Site in a neat and orderly condition which meets the approval of Engineer.
4. Paved Surfaces: Keep clean.
5. Dust Control:
a. Control dust on or near the Work by the application of water or other approved means.
b. If Contractor fails to correct unsatisfactory conditions with 24 hours after due notification:
1) Owner may arrange for such work to be performed by other means.
2) Pay costs.

C. Buildings, Tanks, and Other Structures:
1. Weekly, and more often if necessary:
a. Inspect.
b. Pick up scrap, debris and waste material; remove such items to the place designated for their storage.
c. Sweep interior spaces clean. Clean shall be defined to be free from dust and other material capable of being removed by reasonable diligence using a hand-held broom.
2. Preparation for installation of succeeding material:
a. Clean the building, tank or other structure or pertinent portion thereof:
1) To the degree of cleanliness recommended by the Manufacturer of the succeeding material.
2) Using equipment and materials required to achieve the required cleanliness.
3. Schedule cleaning operations so that dust and other contaminants resulting from cleaning operations will not fall on wet, recently painted or coated surfaces.

3.2 FINAL CLEANING

A. Definitions for Clean: The level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. Prior to Completion of the Work:
1. Remove from the Site all tools, surplus materials, equipment, scrap, debris and waste.
2. Conduct final progress cleaning as described in Article 3.1 above.

C. Site:
1. Unless otherwise specifically directed by Engineer:
a. Hose down paved areas on Site and public sidewalks directly adjacent to the Site.
b. Rake clean other surfaces of the grounds.
2. Remove resultant debris.

D. Buildings, Tanks and Other Structures:
   1. Exterior:
      a. Visually inspect exterior surfaces.
      b. Remove traces of soil, waste material, smudges and other foreign matter.
      c. Remove traces of splashed materials from adjacent surfaces.
      d. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior surface.
      e. In the event of stubborn stains not removable with water, Engineer may require light sandblasting or other cleaning at no additional cost to Owner.
   2. Interior:
      a. Visually inspect interior surfaces.
      b. Remove traces of soil, waste material, smudges and other foreign matter.
      c. Remove traces of splashed materials from adjacent surfaces.
      d. Remove paint droppings, spots, stains and dirt from finished surfaces using only the specified cleaning materials and equipment.
   3. Polished Surfaces: To surfaces requiring the routine application of buffed polish, apply the specified polish as recommended by the Manufacturer of the material being polished.

E. Timing: Schedule final cleaning as approved by Engineer to enable Owner to accept a completely clean Project.

END OF SECTION 01 74 00

SECTION 01 74 26 – DISINFECTION OF DRINKING WATER FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes disinfection of drinking water facilities.

B. Disinfection of Other Components:
   1. Procedures for the disinfection of individual piping systems or of certain project components may be specified elsewhere in these specifications.
   2. Coordinate the work of this Section with the disinfection requirements specified elsewhere.

1.3 DELIVERY

A. Pipes:
   1. Clean inside when delivered to Site.
   2. Stored in a manner to maintain the interior of pipe in clean condition.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 BUILDING PIPES

A. Disinfection: In accordance with:
   1. Division 40 Section “Process Piping Systems.”

3.2 STORAGE TANKS

A. Cleaning:
   1. Remove all debris from tank interior which will be in contact with potable drinking water.
   2. Thoroughly clean interior walls which will contact potable drinking water of all dirt, grease, and other contaminants.

B. Disinfection:
   1. Prepare chlorine solution of at least 200 mg/l to be applied directly to the walls of the tank with suitable brushes or spray equipment.
   2. The strong chlorine solution shall stay in contact with the surfaces to be disinfected for at least 30 minutes; then fill the tank with potable water to its overflow level and collect samples for bacteriological quality analysis.
   3. If samples are satisfactory in quality, the water in the tank may be pumped to the distribution system for use as long as the aesthetic quality is acceptable as determined by Engineer.
   4. Results to be reviewed by Engineer if analyses are unacceptable.
   5. If sample results are not satisfactory, redisinfect as directed by Engineer.
   6. Place in service only after 2 consecutive acceptable bacteriological analyses.

END OF SECTION 01 74 26

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the instructions for and the responsibilities of each party in contract closeout.

B. Related Section includes Certificate of Substantial Completion.

1.3 SUBSTANTIAL COMPLETION

A. Contractor: When Contractor considers that the Work or any portion of the Work is ready for its intended use, Contractor shall submit:
   1. Written certification to Engineer and Owner that the Work, or designated portion of the Work, is substantially complete.
   2. A list of major items to be completed or corrected.
   3. Request that Engineer issue a certificate of Substantial Completion.

B. Engineer's Inspection: Engineer will make an inspection:
   1. Within 10 days after receipt of certification.
   2. Together with Owner and Contractor.

C. Engineer's Determination of Substantial Completion:
   1. Should Engineer consider the Work or designated portion of the Work substantially complete, the following steps shall be taken:
      a. Contractor shall prepare and submit to Engineer, a list of items to be completed or corrected as determined by the inspection.
      b. Engineer will prepare and deliver to Owner:
         1) A tentative certificate of Substantial Completion.
         2) A tentative list of items to be completed or corrected before final payment.
      c. Owner shall have 7 days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list.
      d. Engineer will, within 14 days after delivery of tentative certificate to Owner, decide:
         1) Not Substantially Complete: Engineer will issue written notice to Contractor stating reasons.
         2) Substantially Complete: Engineer will issue definitive certificate of Substantial Completion and a revised list of items to be corrected or completed.
   2. Should Engineer consider that the Work or designated portion of the Work is not substantially complete, the following steps shall be taken:
      a. Engineer shall notify Contractor in writing stating Engineer's reasons.
      b. Contractor shall complete the Work and send a second written notice to Engineer certifying that the Project, or designated portion of the Project, is substantially complete.
      c. Engineer and Owner will reinspect the Work.

D. Division of Responsibilities:
   1. Engineer:
      a. At the time of delivery of tentative certificate of Substantial Completion.
      b. Deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment with respect to:
         1) Security.
         2) Operation.
         3) Safety.
         4) Protection of the Work.

5) Maintenance.
6) Insurance.
7) Warranties.

2. Engineer's written recommendation on division of responsibilities shall be binding on Owner and Contractor until final payment unless Owner and Contractor agree otherwise in writing and so notify Engineer prior to Engineer's issuance of a definitive certificate of Substantial Completion.

1.4 FINAL INSPECTION

A. Contractor Certification: Prior to final inspection, Contractor shall submit written certification that:
1. The Contract Documents have been reviewed.
2. The Project has been inspected in compliance with the Contract Documents.
3. Work has been completed in accordance with the Contract Documents.
4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
5. The Project is complete and ready for final inspection.

B. Engineer's Inspection: The Engineer will make final inspection:
1. Within 10 days after receipt of certification.
2. Together with Owner and Contractor.

C. Engineer's Determination of Final Completion:
1. Should Engineer consider the Work complete and ready for final payment in accordance with the requirements of the Contract Documents, Engineer shall request Contractor to make Project closeout submittals.
2. Should Engineer consider the Work not complete and ready for final payment:
a. Engineer shall notify Contractor in writing stating the reasons.
b. Contractor:
1) Take immediate steps to remedy the stated deficiencies.
2) Send a second written notice to Engineer certifying that the Work is complete.
c. Engineer and Owner will reinspect the Work.

1.5 CLOSEOUT SUBMITTALS

A. Contractor:
1. Provide closeout submittals as required in the Contract Documents.
2. These submittals shall include, but not necessarily be limited to:
a. Project record documents.
b. Operation and maintenance manuals.
c. Guarantees.
d. Spare parts and maintenance materials.
e. Instruction in operation of all systems.

1.6 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

A. Affidavits:
1. Submit with final Application for Payment an affidavit of payment of debts and release of claims.
2. Affidavit shall include:
a. Contractor's release or waiver of lien.
b. Consent of surety of final payment.

B. Execution: All submittals shall be duly executed before delivery to Engineer.

1.7 FINAL ADJUSTMENT OF ACCOUNTS

A. Final Statement: Submit a final statement of accounting, which reflects all adjustments, to Engineer. This statement shall contain the following:
   1. Original Contract Price.
   2. Additions and deductions.
   3. Total Contract Price as adjusted.
   4. Previous payments.
   5. Sum remaining due.

B. Final Change Order: Engineer will prepare a final Change Order reflecting approved adjustments to the Contract Price not previously made by Change Orders.

1.8 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit a final Application for Payment in accordance with the requirements of the Contract Documents.

B. Disposition of Final Application for Payment:
   1. If the final Application for Payment and the Work are acceptable in accordance with the Contract Documents:
      a. Engineer will, within 10 days after receipt of the Application for Payment:
         1) Submit to Owner a written recommendation for payment.
         2) Submit to Owner and Contractor a written notice that the Work is acceptable subject to the provisions of the General Conditions.
      b. Owner will, within 30 days after receipt of the Application for Payment and Engineer's recommendation in accordance with the Contract Documents, pay to Contractor the amount recommended.
   2. If the Application for Payment, the Work or both are unacceptable:
      a. Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment.
      b. Contractor shall make the necessary corrections and resubmit the Application for Payment.
   3. Final Completion Delayed:
      a. Upon receipt of Contractor’s final Application for Payment and recommendation by Engineer, Owner shall make payment of the balance due for that portion of the Work fully completed and accepted if Engineer confirms that final completion of the Work is significantly delayed through no fault of Contractor.
      b. Payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
      c. Contractor shall submit with the Application for Payment written consent of surety if the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 77 00

SECTION 01 78 39 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedures for the maintenance, recording and submittal of Project record documents.

1.3 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Storage:
   1. Store documents and Samples in Contractor's field office apart from documents used for construction.
   2. Provide files and racks for storage of documents.
   3. Provide locked cabinet or secure storage space for storage of Samples.

B. Filing: File record documents in accordance with CSI Masterformat.

C. Maintenance:
   1. Maintain documents in a clean, dry, legible condition and in good order.
   2. Do not use record documents for construction purposes.

D. Availability: Make documents and Samples available at all times for inspection by Engineer.

1.4 RECORDING

A. Labeling: Label each document "PROJECT RECORD" in neat large printed letters.

B. Recording:
   1. Record actual revisions to the Work.
   2. Record information concurrently with construction progress.
   3. Do not conceal any work until required information is recorded.

C. Drawings:
   1. Legibly mark, with notes or graphic representations, to record actual construction.
      a. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
      b. Field changes of dimension and detail.
      c. Changes made by Field Order, Work Change Directive or Change Order.
      d. Details not on original Contract Drawings.
   2. After Engineer's review of the record drawings, transfer all marks to a set of electronic documents provided by Engineer.

1.5 SUBMITTAL

A. Delivery:
   1. At Contract closeout, deliver record documents to Engineer for Owner.

B. Transmittal Letter:
   1. Accompany submittal with transmittal letter in duplicate, containing:
      a. Date.
      b. Project title and number.
      c. Contractor's name and address.
      d. Title and number of each Record Document.
      e. Signature of Contractor or their authorized representative.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 78 39

SECTION 02 22 26 – PRECONSTRUCTION AUDIO-VISUAL DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing of all labor, materials and equipment necessary for a complete color audio-video record of the existing surface features for the entire project to accurately document the pre-construction conditions within the proposed construction's zone of influence.

1.3 SUBMITTALS

A. Qualifications: Submit such information as requested by the Engineer to determine the ability to produce professional video in accordance with industry standards and these specifications.

1.4 QUALITY ASSURANCE

A. Audio-video documentation shall be by a responsible commercial firm regularly engaged in color audio-video construction documentation.

B. Owner reserves the right to reject any audio-video documentation not conforming to these Specifications. Such rejected documentation shall be redone at no additional cost to Owner.

1.5 PRODUCT DELIVERY

A. Deliver to Owner through Engineer hard drives with recorded documentation upon completion of the project or upon completion of segments, if requested.

1.6 SEQUENCING AND SCHEDULING

A. Attend a meeting with Engineer to outline the coverage expected for the project, prior to the start of the video documentation.

PART 2 - PRODUCTS

2.1 Delivered product shall include all digital hard drives, index labels, and runsheet logs.

A. Video to be mastered on high quality formats only:
   1. Flash drive.
   2. Portable hard drive.

B. High quality cameras to be used:
   1. Minimum quality of 12 megapixels.
   2. With 1/4-inch, 1/3-inch or 1/2-inch charged coupled device imaging systems.
   3. With optical stabilization; electronic stabilization is not acceptable.
   4. With 20x minimum optical magnification.
   5. Capable of producing NTSC 525 lines of resolution/60 fields/30 frames per second.
   6. Capable of 3-luxillumination minimum.

C. Index Labels:
   1. All files shall be labeled with appropriate project information and be able to be cross referenced with runsheets.
   2. Label information to include:
      a. File name.
      b. Project title.
      c. Location of project.

d. Month and year of coverage.
e. Set information, i.e., Engineer's set, Owner's set, Contractor's set.
f. Quick reference list of contents of a particular hard drive.

D. Runsheet Logs:
1. Provide a runsheet log that accurately catalogs the contents of each video.
2. Runsheet logs to include:
a. Street name, easement or address.
b. Sheet number or numbers relative to the line entry of a particular area of coverage.
c. Hard drive number.
d. Real time code indexing for each segment of the project indicating hours minutes and seconds to cross reference with playback equipment to locate specific points of interest on the project.
e. Direction of travel for each specific segment.
f. Viewing side for each specific segment.
g. Starting point for each specific segment.
h. Ending point for each specific segment.
i. Project information, i.e., project title, owner, date.

E. Vehicles used while performing documentation to be plainly marked with company name and telephone number with caution signs, flags and strobes to affect a safe and hazard free operation.

PART 3 - EXECUTION

3.1 RECORDING

A. General:
1. Coverage:
a. Recordings shall include coverage of all surface features located within the zone of influence of the proposed construction.
b. The zone of influence is defined as the area within the road right-of-way, area within permanent and temporary easements and adjacent areas which may be affected by routine construction operations.
c. The surface features include, but are not limited to, all roadways, pavements, curbs, driveways, sidewalks, culverts, headwalls, retaining walls, buildings, landscaping, trees, shrubbery, and fences.
d. Of particular concern shall be the existence or nonexistence of any faults, fractures, or defects.
e. All recording shall be performed during times of good visibility.
f. No recording shall take place when there is snow cover on the ground unless authorized by Engineer.
g. The Engineer may designate areas to be omitted or added for audio-video documentation.
h. Areas not accessible by conventional wheeled vehicles shall be accessed by walking or special conveyance.
2. Time of Execution: Prior to placement of equipment and materials on the jobsite.
3. Coverage Continuity:
a. Accessible Areas: Coverage shall consist of a single, continuous, recording which begins at one end of a particular construction area and continues to the other end of that construction area.
b. Non Accessible Areas (Across Easements, Etc.): Coverage shall consist of an organized, interrelated sequence of recordings at various positions along the proposed construction area.
4. Video portion of the documentation shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of picture imperfection.
5. Audio Portion of the Documentation:
a. Shall reproduce the commentary of the camera operator with proper volume, clarity, free from distortion and background noise.
b. Assist in maintenance of viewer orientation and in identification, clarification, or objective description of the structures being shown in the video portion of the recording.
6. Video shall display through electronic means information germane to the current video display.
a. Display continuously information as follows:
1) Time and date of recording.
2) Location of recording, i.e., street name, easement or address.

b. When conventional wheeled vehicles are utilized, include engineering stationing to coincide with project plans, direction of travel and viewing side.
   1) The engineering stationing must be continuous and accurate and reflect the stationing within the field of view.
   2) The engineering stationing must coincide with stationing on project plans and utilize standard engineering symbols, i.e., 5+00.
   3) Global Positioning System satellites may be used with or in place of engineering stationing.
      a) Differential Global Positioning System is to be used where available, with updates 1/second at 5 meter or less spherical accuracy.
      b) Standard Global Positioning System accuracy is as dictated by the United States Department of Defense mandate.
      c) Global Positioning System display will be at 1 meter longitude and 1 meter latitude increments, i.e., 414N529 08317W302.

B. Procedural Requirements for Coverage Rates:
   1. The following table sets the maximum rate of travel for the following areas:

AREA	AVE RATE MAX
Entire Project	30 ft/min

   2. Camera Positioning and Techniques:
      a. Height and Stability: Camera to be mounted securely to produce steady viewing with lens not less than 8 feet above the ground of the area being viewed, or at a level to facilitate best perspective and line of site when using conventional wheeled vehicles.
      b. Control: All movements shall be at a rate that allows recorded objects to be viewed clearly during video playback.
      c. Viewer Orientation for Road Areas: Utilize overall establishing views and visual displays of all visible house and building addresses.
         1) Easement Areas: Highly visible yellow flags shall be used to clearly define proposed centerline of construction.
   3. Private Property:
      a. Contractor shall obtain permission of property owner before entering private property.
      b. If Contractor is refused entry to private property, Contractor shall notify Engineer and wait until permission is obtained before entering the property.

END OF SECTION 02 22 26

SECTION 02 41 19 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the modification, alteration, conversion, and renovation of existing structures:
   1. Be aware of the many incidental items which exist which must be demolished, relocated, or replaced in order to accomplish the remodeling work of trades.
   2. Include the price of such demolition, relocating, and replacement in the base Bid.
   3. These incidental items may or may not be indicated in the Contract Documents.
   4. Contractor and Subcontractors performing remodeling work are expected to be familiar with the unknown nature of existing utilities serving an area to be remodeled and shall calculate the base Bid to include the demolition, removal, relocation, and replacement of these utilities.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the pertinent provisions of the following:
   1. American National Standards Institute: ANSI A10.6 - Safety Requirements for Demolition Operations.
   2. ASTM: D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
   3. EPA: Rule 406(b) of the Toxic Substances Control Act of 1992.
   4. NFPA: NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.4 DEFINITIONS

A. Terms:
   1. Abandon:
      a. Remove an item to the extent that it is not visible and does not interfere with new construction.
      b. Portions of the abandoned item may be left in place.
      c. No abandoned items shall be left below new footings.
   2. Demolish:
      a. Remove existing items from their present location in the Project area and haul to an area outside of the Project area.
      b. Remove utilities serving these items.
   3. Relocate:
      a. Move existing items from their present location to another location in the Project area.
      b. Extend utilities serving the present location to the new location.
   4. Remove:
      a. Except for items indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner’s property, demolished materials shall become Contractor’s property.
      b. Remove existing items from their present location in the Project area and haul to an area outside of the Project area.
      c. Remove utilities serving these items.
   5. Replace:
      a. Remove existing items from their present location in the Project area, haul them to an area outside of the Project area, and furnish and install new items in the same or another location.
      b. Extend utilities serving the present location to the new location.
   6. Reuse: Move existing items from their present location to another location in the Project area. Extend utilities serving the present location to the new location.

7. Historic Items:
    a. Historic items, relics, and similar object including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property.
    b. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 DIVISION OF WORK

A. Work: In accordance with the General Conditions, Contractor is responsible for dividing the Work among the Subcontractors and Suppliers and for delineating the work to be performed by specific trades. The following are suggestions as to how the Work may be divided. This is not a complete list of the work:
    1. Contractor:
        a. Cut and patch walls, floors, and ceilings to allow for recessed utilities and ductwork.
        b. Remove and reinstall existing suspended ceilings to allow for above ceiling construction.
        c. Replace damaged units.
        d. Install new ceilings as indicated on the Drawings.
        e. Place sleeves in new concrete structures.
        f. Patch roof at new penetration and curbs and where existing penetrations and curbs are removed.
        g. Furnish and install new structural steel where required for reinforcement at floor, wall, and roof openings.
        h. Install fire stop and smoke stop systems at penetrations for ratings indicated in accordance with local building codes.
    2. Mechanical, Electrical, and Fire Protection Subcontractors:
        a. Furnish sleeves for use in new concrete construction.
        b. Install fire stop and smoke stop systems at utility penetrations in accordance with local building codes.
        c. Furnish and install sleeves in gypsum board and masonry construction.
        d. Core drill existing concrete for new utilities and sleeves after obtaining Engineer's review of locations.
        e. Remove and reinstall existing fire protection heads to allow for ceiling removal and installation.
        f. Furnish new heads, piping, and connections as required for completion of the Work.
    3. Miscellaneous:
        a. Each trade shall be financially responsible for cutting and patching for sleeves, penetrations, and installation of isolated components as necessary for its work unless herein specifically stated to the contrary.
        b. On renovation projects, cut and patch walls, floors, and ceilings to allow for continuous runs of recessed utilities and ductwork.
        c. Patching shall be done by the trade whose work is damaged.
        d. Costs caused by defective or ill-timed work shall be borne by the party responsible.
        e. Each trade shall do fitting of its own work as required to make its several components fit together or to receive the work of other trades.

1.6 SUBMITTALS

A. Predemolition Audio-Video:
    1. Submit showing existing conditions of construction to remain that could be misconstrued as damage caused by construction activities.
    2. Including building and Site, as well as interior and exterior finishes.
    3. Submit prior to commencing Work.

1.7 QUALITY ASSURANCE

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

B. Regulatory Requirements:
    1. Comply with governing EPA notification regulations before beginning selective demolition.
    2. Comply with hauling and disposal regulations of authorities having jurisdiction.
    3. Comply with ANSI A10.6 and NFPA 241.
    4. Comply with 29 CFR 1926.62-(OSHA Paint Standard).

C. Pre-Demolition Conference:
   1. Conduct pre-demolition conference at Site.
   2. Review methods and procedures related to selective demolition including, but not limited to, the following:
      a. Inspect and discuss condition of construction to be selectively demolished.
      b. Review structural load limitations of existing structure.
      c. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and to avoid delays.
      d. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.8 PROJECT CONDITIONS

A. Owner Occupancy:
   1. Owner will occupy portions of building immediately adjacent to selective demolition area.
   2. Conduct selective demolition so Owner's operations will not be disrupted.
   3. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Access:
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
   2. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. Conditions:
   1. Owner and Engineer assume no responsibility for condition of areas to be selectively demolished.
   2. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as far as practicable.

D. Storage or sale of removed items or materials on Site will not be permitted.

E. Maintenance of Utilities:
   1. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   2. Maintain fire-protection facilities in service during selective demolition operations.

F. Unknown Hazardous Materials:
   1. It is not expected that hazardous materials will be encountered in the Work.
   2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner.
   3. Hazardous materials will be removed by Owner.

G. Lead Paint: Remove and remediate existing lead paint as required to comply with all codes and requirements while performing the requirements of the Work. Either remove lead paint completely or partially as required to achieve this.

1.9 WARRANTIES

A. Existing Warranties:
   1. Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.
   2. If possible, retain original installer or fabricator to patch exposed work that is damaged during selective demolition.
   3. If it is not possible to engage original installer or fabricator, engage another recognized, experienced, and specialized firm.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. Materials and workmanship shall conform to the requirements of other Sections of the Specifications.
2. Where no materials are specified in these specifications, use materials of an equivalent type, quality, and size to match those existing in other areas of the facility.
3. If none exist, use materials and workmanship recognized as of the highest quality in the industry.
4. Obtain Engineer's review of such material and workmanship.

B. Piping: Existing piping which is removed from its present location shall not be reused where new piping is required unless specifically noted on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled, and of items to be removed and salvaged.

D. Conflicts:
1. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict.
2. Promptly submit written report to Engineer.

E. Survey, or engage a competent person to survey condition of the building, in accordance with requirements of OSHA, to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition operations.

F. Perform additional surveys as the work progresses to detect hazards resulting from operations to date.

3.2 UTILITY SERVICES

A. Maintain existing services indicated to remain and protect them against damage during selective demolition operations.

B. Interruptions:
1. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner.
3. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

C. Utility Requirements:
1. Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.
3. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition, provide temporary utilities that bypass areas of selective demolition and that maintain continuity of service to other parts of building.
4. Cut off pipe or conduit in walls or partitions to be removed.
5. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls:
   1. Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   2. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and other authorities having jurisdiction.
   3. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   4. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   5. Protect existing Site improvements, appurtenances, and landscape features to remain.
   6. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line or groups of trees to remain.

B. Temporary Facilities:
   1. Protection:
      a. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
      b. Provide protection to ensure safe passage of people around selective demolition area, and to and from occupied portion of building.
      c. Weather Protection:
         1) Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
         2) Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures.
         3) Coordinate enclosures with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
      d. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
      e. Cover and protect furniture, furnishings, and equipment that have not been removed.
   2. Shoring and Bracing:
      a. Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
      b. Strengthen or add new supports when required during progress of selected demolition.

3.4 POLLUTION CONTROLS

A. Dust Control:
   1. Use water mist, temporary closures, and other suitable methods to limit spread of dust and dirt.
   2. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
   3. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure.
   4. Vacuum carpeted areas.
   5. Comply with governing environmental protection regulations.

B. Disposal:
   1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   2. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

3.5 GENERAL

A. Demolish and remove existing construction only to the extent required by new construction and as indicated.

B. Methods:
   1. Use methods required to complete the work within limitations of governing regulations.
   2. Level by Level:
      a. Proceed with selective demolition systematically, from higher to lower level.
      b. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   3. Cutting Openings:
      a. Neatly cut openings and holes plumb, square, and true to dimensions required.
      b. Use cutting methods least likely to damage construction to remain or to adjoining construction.
      c. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.
      d. Temporarily cover openings to remain.
   4. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   5. Flame Cutting:
      a. Do not use cutting torches until work area is cleared of flammable materials.
      b. At concealed spaces, such as duct and pipe chases, verify condition and contents of hidden space before starting flame-cutting operations.
      c. Maintain fire watch and portable fire suppression devices during flame-cutting operations.
      d. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials, and promptly and legally dispose of off Site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly.
   10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

C. Existing Facilities: Comply with Owner's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during the selective demolition operations.

D. Removed and Salvaged Items:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning and identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's storage area on Site.
   5. Protect items from damage during transport and storage.

E. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Paint equipment to match new equipment.
   3. Pack or crate items after cleaning and repairing, and identify contents of containers.
   4. Protect items from damage during transport and storage.
   5. Reinstall items in locations indicated.
   6. Comply with requirements for new materials and equipment.
   7. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

F. Existing Items to Remain:
   1. Protect construction indicated to remain against damage and soiling during selective demolition.
   2. When permitted by Engineer, items may be removed to a suitable, protected storage location and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 DEMOLITION

A. Structures:
   1. Cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the Drawings, herein specified and necessary to permit completion of the Work.
   2. Dispose of demolished materials in an approved manner.
   3. Include necessary cutting, bending, and welding of reinforcing steel, structural steel, or miscellaneous metal work found embedded in the existing structures.
   4. When removing materials or portions of existing structures, shore up, underpin, and protect adjacent structures.
   5. Concrete:
      a. Demolish in small sections.
      b. Cut concrete to a depth of at least 3/4-inch at junctures with construction to remain, using a power driven saw.
      c. Dislodge concrete from reinforcement to remain at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated.
      d. Neatly trim openings to dimensions indicated.
   6. Engineer's review of cutting: No existing structure, equipment or appurtenance shall be shifted, cut, removed or otherwise altered without obtaining review of Engineer.

B. Equipment:
   1. Dismantle, remove, and relocate existing equipment, piping, and other appurtenances required for the completion of the Work.
   2. Cut existing pipelines for the purpose of making connections thereto.
   3. Cut off anchor bolts for equipment and structural steel indicated to be removed 1-inch below the concrete surface.
   4. Patch remaining concrete surface to smooth even finish.
   5. Remove air conditioning equipment without releasing refrigerants, if applicable.

C. Piping, Fire Protection, and Electrical Components:
   1. When a new connection is made to an existing pipeline, install additional new piping, extending to and including the most convenient new valve.
   2. Piping, conduit, and wiring indicated or required to be demolished shall be done so to the nearest reasonable connection outside of the Project area or as directed by Engineer.
   3. Where necessary or required for the purpose of making connections, cut existing pipelines in a manner to provide an approved joint.
   4. Weld beads, flanges, and provide Dresser couplings on existing and new piping.
   5. Remove and reinstall existing fire protection heads to allow for new construction.
   6. Comply with applicable fire protection codes.
   7. Furnish new heads, piping, and connections as required for completion of the Work.
   8. Remove junction boxes and electrical outlets which will no longer be in use.
   9. At existing walls which are made thicker, extend piping and wiring to accommodate additional wall thickness.
   10. Remove and reinstall fixtures and electrical outlets, switches, etc.

D. Masonry Walls:
   1. Where masonry walls are to be removed and replaced, and where filling existing openings, allow for toothing in of the new masonry at alternate courses so that the existing running bond pattern is maintained.
   2. Brick:
      a. Existing brick which becomes exposed due to the removal of materials such as adjacent walls, windows, doors, cabinetry, equipment, etc., shall be thoroughly cleaned, scraped, brushed, and tuck pointed to match adjacent existing brick.
      b. Blend appearance of exposed brick with the adjacent brick.
      c. Replace damaged brick.

E. Ownership of Salvaged Materials:
   1. Materials and equipment removed shall remain the property of Owner at Owner's option.
   2. Items not salvageable, as determined by Engineer and Owner, and items Owner elects not to keep shall become the property of Contractor to be properly disposed of off the Site.
   3. Salvaged equipment shall be thoroughly cleaned, lubricated, and greased for protection during prolonged storage.

F. Nonshrink Grout: Use nonshrink grout for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as indicated.

G. Protect Facility from Water Damage: Provide flumes, hoses, piping, suitable plugs, bulkheads, or other means to divert or hold back the flow of wastewater, water, or other liquids, as required for proper performance of the Work.

H. Blasting: Not permitted.

I. Sleeves:
   1. Subcontractors for mechanical, electrical, and other trades shall furnish sleeves and inserts for pipes, conduits, and similar items in forms, walls, partitions, and floors.
   2. Perform work in cooperation with Contractor.
   3. Place items in ample time so as not to delay operations.
   4. Do not place sleeves so they pass through beams, girders, and similar construction.

J. Firestopping and Smokestopping: Install firestop and smokestop systems at utility penetrations in accordance with local building codes.

3.7 PATCHING AND REFINISHING

A. Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching:
   1. Patch and repair existing surfaces from which items have been removed leaving holes, fasteners, and surface blemishes exposed to view.
   2. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
   3. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to Manufacturer’s written recommendations.
   4. Comply with Division 01 Section “Cutting and Patching.”

C. Refinishing:
   1. Prepare existing surfaces for finishes by scraping, sanding, filling, acid etching, and sand blasting to ensure bonding and a smooth finish.
   2. Refinish entire surfaces as necessary to provide an even finish.
   3. Refinish continuous surfaces to the nearest intersection and entirely finish assemblies.
   4. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
   5. Refinish entire surfaces if necessary to remediate existing lead painted surfaces.

3.8 CLEANING

A. Clean materials installed under this Section in accordance with Division 01 Section “Cleaning and Waste Management.”

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations.

C. Return adjacent areas to conditions existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 03 01 33 – REHABILITATION OF CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Locating and removing delaminated, spalled and unsound concrete.
   2. Preparing cavities created by removal to receive patching materials.
   3. Replacing existing deteriorated concrete and reinforcement.
   4. Reinforcement of existing structural elements with carbon fiber reinforced composite systems.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM:
      a. A615 – Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
      b. A1064 – Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
      c. C33 – Concrete Aggregates.
      d. C94 – Ready-Mixed Concrete.
      e. C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
      f. C136 – Sieve Analysis of Fine and Coarse Aggregates.
      g. C150 – Portland Cement.
      h. C260 – Air-Entraining Admixtures for Concrete.
      i. C309 – Liquid Membrane Forming Compounds for Curing Concrete.
      j. C494 – Chemical Admixtures for Concrete.
   2. ACI:
      a. 301 – Specifications for Structural Concrete.
      b. 302.1R – Guide for Concrete Floor and Slab Construction.
      c. 390R – Guide to Consolidation of Concrete.
      d. 347R – Guide to Formwork for Concrete.
      e. 440.2R – Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures.
      f. 503.2 – Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive.
      g. 503R – Pull Off Test to Determine CFRP Adhesive to Concrete Substrate.
      h. 546.1R – Guide for Repair of Concrete Bridge Superstructures.
   3. US Corps of Engineers:
      a. EM – 1110-2 – Corp of Engineers Manual.
   4. International Concrete Repair Institute (ICRI).
   5. American National Standards Institute (ANSI)/National Sanitation Foundation (NSF) - NSF 61 - Drinking Water System Components - Health Effects.

1.4 DEFINITIONS

A. Delaminations: Fracture planes or “internal cracks,” within concrete. Typically, these fractures are parallel to the member face and vary in depth.

B. Spalls: Potholes, cavities or voids in floor slabs, beams, columns, or walls, usually the result of delaminations migrating to the face of the concrete member. When the delamination reaches the surface, concrete encompassed by the delamination breaks away, resulting in a spall.

C. Unsound Concrete: Concrete exhibiting one or more of the following:
   1. Incipient fractures present beneath existing delaminated or spalled surfaces.
   2. Honeycombing.
   3. Friable or punky areas.
   4. Deterioration from freeze-thaw action.

D. Saturated Surface Dry (SSD): The condition in which the concrete is saturated with water and cannot absorb more, but no free water is present on the surface and is in accordance with the ICRI recommendations.

E. CFRP:
   1. FRP.
   2. Carbon fiber reinforced plastic.
   3. Carbon fiber reinforced polymer.

1.5 SUBMITTALS

A. Shop Drawings: Submit complete Shop Drawings for each installation of the CFRP system. The Shop Drawings shall contain details of the number and thickness of layers, joint and end details, and locations to be applied.

B. Product Data:
   1. For each repair material, include specifications and recommended application procedures showing compliance with the project requirements.
   2. Include proof of NSF certification.
   3. Provide safety data sheets for products used.
   4. Product Suitability:
      a. Submit signed letter from Product Manufacturer’s technical representative stating that they have visited the Site, reviewed conditions and agree that the products specified are suitable for this application.
      b. The letter shall certify that the Product Manufacturer’s technical representative:
         1) Is familiar with the project, aware of job conditions and aware of associated products (i.e., sealants, concrete repair products and other proposed for the Project).
         2) Agrees with the intended application of their products as specified.
         3) Agrees with the surface preparation specified.
         4) Agrees with project specifications. If necessary, submit revisions to project specifications.
         5) Agrees that their product is compatible with associated products (i.e., sealants, concrete repair materials and other proposed for the Project).
         6) Agrees with the type and quantity of testing specified to ensure their product is adequately installed.
         7) Agrees that all components of concrete repair materials furnished comply with this Specification and are compatible.
   5. Design Data: Submit calculations for the CFRP system for approval by Engineer, stamped by a structural engineer licensed in the location of the Work. Calculations shall conform to ACI 440.2R.

C. Surface Preparation Method: Submit details of preparation method to Engineer for review prior to commencing work.

D. CFRP’s Project Record: Applicator shall keep a detailed record of coating application areas and submit to Engineer.

1.6 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.
   3. Each component of a system or product shall be installed by Manufacturer trained personnel. Installers shall demonstrate knowledge of product and installation.
   4. Provide Manufacturer's certification of the applicator's training and experience with the systems to be installed.

B. Manufacturer's Services:
   1. Provide on Site attendance by product Manufacturer's technical representative during the preparation and installation of the CFRP system. Review the work to be performed with the applicator.
   2. Provide 1 day of product Manufacturer's technical representative for start-up of application for each repair product. Review the work to be performed with the applicator.

C. CFRP Installation Contractor's Supervising Site Representative:
   1. On Site during work being performed.
   2. Knowledgeable in all aspects of the CFRP work.
   3. Review each day's agenda with crew and Contractor's representative.
   4. If a portion of the repair work becomes unclear as to the most appropriate direction, work shall stop until a consensus is reached by all parties, including the Engineer's representative and the Manufacturer's technical representative as required.

D. Mock-ups:
   1. Complete mock-ups of:
      a. Repair cavity preparation.
      b. Patch repair.
   2. Obtain Engineer's and Owner's approval of mock-up prior to continuing.
   3. Mock-ups may be completed as part of Contract Work upon approval of the Engineer.

E. Testing:
   1. Concrete and Prebagged Mixes:
      a. The Owner will engage a special inspector approved by the Engineer and Owner.
      b. Contractor shall cooperate fully with the Engineer and the special inspector while they perform testing.
      c. Contractor shall provide the cost for additional material, time and expense; and repair cost to allow the testing to be performed.
      d. The representative of the special inspector shall be at the Site for sampling, inspection and testing during concrete repair placement.
      e. Concrete Repair Material Testing:
         1) Compressive strength, slump and concrete temperature tests shall be performed at the point of placement for each batch of ready-mixed concrete and prebagged repair mixes used each day.
         2) Mold 3 x 6 compressive strength test specimens in accordance with ASTM C31 and test in accordance with ASTM C39.
         3) Perform slump and temperature tests in accordance with ASTM C143 and C1064, respectively.
         4) Test 2 cylinders minimum per set of specimens for compressive strength at 7 days and 2 cylinders minimum for compressive strength at 28 days.
         5) Mold 2 reserve cylinders for testing at later ages if required.
      f. Trowel Applied Prebagged Mixes: Make 1 set of three 2-inch cubes from each prebagged mix placed each day for the Owner's testing agency to test in accordance with ASTM C109 and Manufacturer's requirements.
   2. CFRP Testing: The Owner will retain the services of a qualified testing agency to perform the pull off tests for the CFRP. Locations and number of tests shall be as recommended by the CFRP Manufacturer.
   3. The adhesive strength of the concrete repair at CFRP locations shall be verified after preparation by random pull-off testing (ACI 503R) at the direction of the Engineer. Minimum tensile strength shall be 200 psi with concrete substrate failure; or as approved by the Engineer.

1.7 TEMPORARY HEATING, VENTILATION AND HUMIDITY CONTROL DESIGN AND PERFORMANCE REQUIREMENTS

A. The Installation Contractor or a Specialty Contractor shall provide temporary/mobile air temperature, humidity and ventilation control during the course of this project.

B. Provide additional equipment and fuel as required to condition the space for surface preparation, application of products, and curing of those products, in accordance with Manufacturer's requirements. This equipment may include, but not be limited to, dehumidification, heaters, and fans for intake and exhaust air.

C. Contractor shall not use Owner's electrical power for temporary/mobile air system.

1.8 WARRANTY

A. All material installed under this section shall be fully warranted for a period of five years against defects in materials or workmanship commencing with the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Potable Drinking Water Standards: Products used inside the reservoirs shall meet the standards required by the applicable approving Agency for potable drinking water and unless otherwise accepted by that Agency, shall meet the requirements for ANSI/NSF Standard No. 61 – Drinking Water Systems Components – Health Effects.

B. VOC Compliance:
   1. All individual coatings and coating systems shall have VOC levels at or below the EPA recommendations identified in 40 CFR Part 59.
   2. VOC content shall be tested in accordance with EPA Method 24.

C. Vertical and Overhead (Walls and Ceilings) Trowelable Concrete Repairs:
   1. Prebagged products.
   2. SikaQuick VOH.
   3. Euclid Verticoat Supreme.

D. Horizontal (Slabs) Trowelable Concrete Repairs:
   1. Prebagged Products:
      a. SikaTop 122+.
      b. Euclid Concrete-Top Supreme.

E. Membrane Curing Compound:
   1. Comply with ASTM C309.
   2. Products:
      a. 1100 Clear by W.R. Meadows.
      b. Rez Cure (J-11-W) by Dayton Superior.
      c. L&M Cure by L&M Construction Chemicals.

F. Corrosion Inhibitor (Surface Applied On Reinforcing Bars Only):
   1. Sika Armatec 110 Epo Cem by Sika.
   2. Dural Prep AC by Euclid.

G. Steel Reinforcing:
   1. Reinforcing Bars: ASTM A615, yield stress Fy = 60,000 psi.
   2. Welded Wire Fabric: ASTM A185, yield stress Fy = 65,000 psi.

H. Fiber Reinforced Composite Systems:
   1. Products:
      a. Sika Carbodur System by Sika Corporation.
      b. Tyfo Fiberwrap System by Fyfe Co. LLC.
   2. Provide other materials as needed for the proper installation of the complete composite system as selected by the Contractor in conformance with these Specifications.

I. General: Provide primers as required in accordance with Manufacturer's recommendations.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation: Install products in strict accordance with Manufacturer’s recommendations.

B. Inspection: Do not install patching or reinforcing material until Engineer has inspected the repair site.

C. Shoring: Provide catch platform if required for removed concrete.

D. Waste Removal: Remove waste material from Site and dispose of legally.

3.2 CONCRETE REPAIRS

A. General:
1. Delaminated Areas:
a. Examine cavities prior to commencement of patching operations.
b. Include sounding surfaces as part of examination.
c. Remove delamination noted during sounding as specified in this Section.
d. Once located by Contractor, further sound delaminations to define limits.
e. Mark limits with chalk or paint.
f. Remove concrete from within marked boundary to minimum depth of 3/4-inch using 15 pound maximum electric or pneumatic chipping hammers or hand tools.
g. If delaminations exist beyond minimum removal depth, continue chipping until unsound and delaminated concrete has been removed from cavity.
h. Engineer will define and mark additional unsound concrete areas for removal, if required.
2. Spalls:
a. Locate spalls by visual inspection.
b. Mark boundaries with chalk or paint after sounding surface.
c. Engineer will define and mark additional unsound concrete areas for removal, if required.
3. Embedments:
a. Locate and determine depth of embedded reinforcement. electrical conduit and other embedments in repair area.
b. Mark these locations for reference during concrete removal.
c. Where embedded reinforcement or electrical conduit is exposed by concrete removal, exercise extra caution to avoid damaging it during removal of unsound concrete.
d. Repair damage due to removal operations in accordance with building code requirements at no cost to the Owner.
e. Embedded materials which are defective prior to construction may be repaired or replaced by Contractor or abandoned at Owner’s option and cost.
4. Sawcut Edges:
a. Field verify existing depth of reinforcement prior to saw cutting concrete.
b. For vertical and overhead surfaces sawcut marked boundary sawcut to depth of 1/2-inch to 0.625-inch into existing concrete, measured from original surface, provided reinforcement is deeper than those distances.
c. Edges shall be straight and patch areas square or rectangular-shaped.
d. Diamond blade saw or grinder with abrasive disk suitable for cutting concrete is acceptable for performing work.
e. Dress edge cut at delamination boundary perpendicular to member face and be of uniform depth, for entire length of cut.
f. Exercise extra caution during sawcutting to avoid damaging existing reinforcement, electrical conduit and other embedded items near surface of concrete.
g. Repair damage to existing reinforcement or other embedment caused by Contractor at no additional cost to Owner.
5. Clearance:
a. Remove concrete to provide minimum of 3/4-inch clearance on all sides of defective or damaged exposed embedded reinforcement that is left in place.
b. Provide minimum of 1-1/2-inch concrete cover over new and existing reinforcement.
c. Concrete cover over reinforcement may be reduced to 1-inch with Engineer approval if coated with an approved epoxy resin.
6. Preparing Cavities:
a. Sandblast cavities; water blasting is prohibited.
b. Remove deleterious materials such as damaged concrete, corrosion, laitance, dirt and grease from concrete surfaces.
c. Roughen surface to CSP-7 as defined by the ICRI.
d. Air blasting as final step to remove sand.
e. Apply corrosion inhibitor on full circumference of reinforcing bars.
7. Rectangular Areas: Areas to be removed shall be as straight and rectangular as practical to encompass repair and provide neat patch. Avoid acute angles on patch.

8. Reinforcement Repair:
   a. Supplement defective or damaged embedded reinforcement by addition of reinforcement of equal diameter with Class “B” minimum splice in accordance with ACI 318 beyond damaged portion of reinforcement.
   b. Secure new reinforcement to existing reinforcement with wire ties or approved anchors into concrete, or both.
   c. Supplemental reinforcement shall be installed in accordance with ACI 318 and ACI 301.
   d. If rust is present on embedded reinforcement where it enters sound concrete, additional removal of concrete along and beneath reinforcement is required.
   e. Additional removal shall continue until non-rusted reinforcement is exposed, or may be terminated as Engineer directs.
      1) If bond between exposed embedded reinforcement and adjacent concrete is impaired by removal operations, perform additional removal around and beyond perimeter of reinforcement for minimum of 3/4-inch along entire length affected at no cost to Owner.
      2) Remove rust from the full circumference of reinforcement.
   f. Embedded reinforcement exposed during surface preparation that has lost more than 10% of original cross-section due to corrosion shall be considered defective.
   g. Non-defective exposed reinforcement that has lost section to extent specified as direct result of Contractor’s removal operations shall be considered damaged.
   h. Exposed steel shall be cleaned of rust to bare metal by sandblasting; water blasting is not allowed.
   i. Cleaning shall be completed immediately before patch placement to ensure that base metal is not exposed to elements and further rusting for extended periods of time.
   j. Loose reinforcement exposed during surface preparation shall be securely anchored prior to patch placement.
   k. Drilled-in anchors shall be approved by the Engineer.
   l. Engineer will determine adequacy or wire ties and approve other anchoring devices prior to their use.
   m. Securing loose reinforcement is incidental to surface preparation and no additions to the Contract Sum will be allowed for this work.
9. Inspection of Repair Preparation:
   a. Inspection:
      1) After removals are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and verified by Engineer for compliance with requirements of this Section.
      2) Where Engineer finds unsatisfactory cavity preparation, Engineer shall direct Contractor to perform additional removals. Engineer shall verify areas after additional removals.
   b. Defects:
      1) Inspect embedded reinforcement and conduits exposed within cavity for defects due to corrosion or damage resulting from removal operations.
      2) Notify Engineer of defective and damaged reinforcement or conduits.
      3) Replace damaged or defective reinforcement or conduits according to this Section and as directed by Engineer.
10. Provide other surface treatment as required by the Manufacturer of the patching compounds.
11. Inform Engineer at least 2 days in advance of concrete repair placement to allow adequate time for Engineer to schedule inspection.
12. Use form and fill method, trowel on fill method, or shotcrete fill method, as Manufacturer recommends.
13. Pre-dampen cavity surface with clean water. Cavity concrete surfaces shall be saturated surface dry (SSD) with no free water. Provide 24 continuous hours of poured water on horizontal surface cavities and 24 continuous hours of sprinkler wetting on vertical surface cavities immediately prior to placement of concrete repair material.
14. Concrete shall be placed continuously at each repair area until reinforcing steel is encapsulated, forms are full and air pockets are eliminated.
15. Vibrators shall be utilized to assist in consolidating concrete. Concrete shall not be over vibrated. Over vibration of concrete (concrete segregation) shall be cause for rejection of the work. Refer to ACI 309R for assistance with the selection, numbers and use of vibrators.
16. Protect freshly applied concrete from premature drying and maintain with minimal moisture loss at a relatively constant temperature for a minimum of 7 days.
17. Use a form release agent that is compatible with specified curing compounds.
18. Leave forms in place for a minimum of 3 days.

19. Immediately after removing forms, either wet cure or apply at least 2 coats of curing compound in accordance with Manufacturer's recommendations.
20. 14 days or later after installation of repairs, sound repair concrete in presence of Engineer. Remove delaminated or otherwise unsound concrete encountered and install new repair concrete.

B. Floor Slabs:
1. Delaminations: Locate by sounding surface with hammer, rod, or chain drag.
2. When delaminated area is struck, distinct hollow sound is heard.
3. Sound designated floors for delaminations.

C. Vertical and Overhead Surfaces:
1. Surface Delaminations: Locate by sounding appropriate member with hammer or rod.
2. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.

D. Coat and Protect:
1. After sandblasting operations and cleanup are completed, paint exposed steel with an approved epoxy.
2. Protect prepared surfaces from damage prior to and during patch placement.

3.3 FIBER REINFORCED COMPOSITE SYSTEMS REPAIRS

A. General:
1. Manufacturer shall provide the services of a registered structural engineer to perform the design of the CFRP system.
2. The lost area of reinforcing steel due to saw cut openings, which the CFRP system strength shall be designed to equal or exceed, is indicated on the Drawings.
3. Approximate locations of CFRP system is indicated on the Drawings.
4. The surface to receive composite shall be free from fins, sharp edges and protrusions that will cause voids behind the installed composite or that, in the opinion of Engineer, will damage the fibers. Existing uneven surfaces to receive composite shall be filled with epoxy filler or other material approved by Engineer. The contact surfaces shall have no free moisture on them at the time of application.
5. Round off sharp and chamfered corners to radius of 1-inch (±0.25-inch) by means of grinding or forming with the system's thickened epoxy. Variations in the radius along the edge shall not exceed 1/2-inch for every 12 inches of length.
6. For surfaces which do not allow complete encasement with the composite system, surfaces shall be prepared for bonding by means of abrasive blasting or grinding to achieve a 1/16-inch minimum amplitude. Contact surfaces shall then be cleaned by hand or compressed air. One prime coat of the Manufacturer's epoxy shall be applied. Prior to the application of the saturated composite fabric, fill uneven surfaces with the Manufacturer's thickened epoxy. Provide anchorage as required by the Manufacturer, but as a minimum, as indicated on the Drawings.
7. Verify ambient and concrete temperatures. No work shall proceed if the temperature of the concrete surface being repaired is less than 35 degrees F or greater than 100 degrees F. The temperature of the epoxy components shall be between 35 and 100 degrees F at the time of mixing or as specified on the component labels. When air temperature is outside the prescribed range, other measures must be employed to ensure component's temperature is maintained within this range.
8. Prepare the epoxy matrix by combining components at a weight (or volume) ratio specified on the Manufacturer's labeled units, with an allowable tolerance as specified by the Manufacturer. The components of epoxy resin shall be mixed with a mechanical mixer until uniformly mixed, typically 5 minutes at 400-600 rpm. Components which have exceeded their shelf life (as designated on the material label) shall not be used.
9. Saturation of the fabric shall be performed and monitored according to Manufacturer's specified fiber-resin ratio. A previously calibrated saturator can be used to achieve the specified ratio. Fabric shall be completely saturated prior to application to contact surface in order to ensure complete impregnation of fabric. Saturation shall be supervised and checked by the properly trained representative of the installer.
10. Clean the CFRP laminate (roughened side) with an appropriate cleaner (e.g., acetone). Dry CFRP laminate with a clean rag.
11. Apply the mixed epoxy resin onto the CFRP laminate with a "roof-shaped" spatula to a nominal thickness of 1/16-inch (1.5 mm).

12. Within the open time of the epoxy, depending upon the temperature, place the CFRP laminate onto the concrete surface. Using a hard rubber roller, press the laminate into the epoxy resin until the adhesive is forced out on both sides. Remove excess adhesive.
13. Curing: The external reinforcement shall not be disturbed for a minimum of 24 hours.

3.4 ENCLOSURE

A. Construct a weather-tight enclosure around the exterior of the surface to be repaired if recommended by the Manufacturer to control temperature. The enclosure shall be of such quality as to maintain optimal conditions for the repair work.

B. The enclosures shall remain until the repair work is sufficiently cured.

C. Provide additional equipment as required to condition the space for repair work. This equipment may include, but not be limited to, heaters, dehumidification, and fans for intake and exhaust air.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Engineer: Check work.

B. Promptly make corrections, changes, and additions required by Manufacturer's engineer.

3.6 CLEANING

A. Clean materials installed under this Section in accordance with Division 01 Section "Cleaning and Waste Management."

END OF SECTION 03 01 33

SECTION 03 15 16 – POST-INSTALLED ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of post-installed anchors.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following pertinent provisions:
   1. ASTM:
      a. A240 - Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
      b. E488 - Strength of Anchors in Concrete and Masonry Elements.
      c. E1512 - Testing Bond Performance of Bonded Anchors.
      d. F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs.
      e. F594 - Stainless Steel Nuts.
   2. ACI:
      a. 318, Chapter 17 - Anchoring to Concrete.
      b. 355.2 - Qualification of Post-Installed Mechanical Anchors in Concrete.
      c. 355.4 - Qualification of Post-Installed Adhesive Anchors in Concrete.
   3. International Code Congress Evaluation Service - ICC-ES:
      a. AC-193 - Mechanical Anchors in Concrete Elements.
      b. AC-308 - Post-installed Adhesive Anchors in Concrete Elements.
   4. Michigan Building Code.

1.4 SUBMITTALS

A. Product Data: For each anchor type to be furnished for each base material to which it will be fastened, including:
   1. Anchor specific type, physical properties and installation procedures.
      a. General catalog sheets of anchors without specific reference are not acceptable.
   2. Strength developed by anchor in each base material to which each is being fastened.
   3. Anchor embedment depth in base material.
   4. Anchor material.
   5. ICC-ES Report for each specific anchor indicating compliance to applicable building code.

1.5 QUALITY ASSURANCE

A. Provide special inspections of post-installed anchors in accordance with Division 01 Section “Special Inspections and Tests.”

B. Compliance:
   1. Mechanical anchors shall comply with AC-193 and ACI 355.2.
   2. Adhesive anchors shall comply with AC-308 and ACI 355.4.

C. Installation Personnel Qualifications:
   1. Knowledgeable of the specific Manufacturer’s requirements for proper installation of post-installed anchors.
   2. Anchor installers shall be properly trained by the anchor Manufacturer on Site.
      a. Anchor Manufacturer’s representative shall not be a distributor or third party.

b. The installers to be trained shall be the actual person or persons installing the anchors, not the foreman, superintendent or similar supervisory personnel.
c. The on Site training shall include training for installation of each anchor in each substrate on the Project for each trade.
d. Each person installing the anchor shall be trained.
e. Anchor installation training shall take place prior to the installation of the anchors. The installer shall have training verification available for review at any time.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Hilti.

B. Products of the following manufacturers are among those which may be considered equal based on Submittals reviewed by Engineer; approval or rejection of the proposed or equal will be at Engineer's sole discretion:
1. Powers/Rawl.
2. Redhead.
3. Simpson.

C. If Contractor intends to substitute other than Basis of Design products, Contractor shall be responsible to submit substitution product data that proves equivalence including, but not limited to:
1. Capacities for specific anchor sizes, embedment lengths, and base materials into which the anchor will be fastened.
2. Capacity reduction factors for spacing and edge distance.
3. Material of each anchor type.
4. ICC ES report applicable to each anchor type.

2.2 MATERIALS

A. Actual or Potential Ambient Conditions:
1. Stainless steel in accordance with ASTM F593.

2.3 POST-INSTALLED ANCHORS

A. Anchors that Resist Loads Through Mechanical Friction or Keying Forces:
1. Expansion Anchors Approved for Use in Cracked Concrete:
a. Wedge style anchor.
b. Hilti Kwik Bolt TZ2 (ICC-ESR 4266).
c. Capable of sustaining an ultimate load of 4 times the imposed load capacity in concrete when tested in accordance with ASTM E488.
2. Expansion Anchors Approved for Use in Uncracked Concrete:
a. Wedge style anchor.
b. Hilti Kwik Bolt TZ2 (ICC-ESR 42660.
c. Capable of sustaining an ultimate load of 4 times the imposed load capacity in concrete when tested in accordance with ASTM E488.
3. Sleeve Anchors Approved for Use in Cracked and Uncracked Concrete:
a. Expanding sleeve style anchor.
b. Hilti HSL-3 (ICC-ESR 1545).
c. Hex, acorn, round or flat head anchor or threaded anchor with hex nut as situation requires or as indicated on the Drawings.
4. Undercut Anchors Approved for Use in Cracked and Uncracked Concrete:
a. Expanding sleeve, self-undercutting wedge style anchor.
b. Hilti HDA (ICC-ESR 1546).
c. Hex or flat head anchor or threaded anchor with hex nut as situation requires or as indicated on the Drawings.
5. Screw Style Anchors Approved for Use in Cracked Concrete:
a. Hilti Kwik HUS EZ (ICC-ESR 3027).
b. Capable of sustaining an ultimate load of 4 times the imposed load capacity in concrete when tested in accordance with ASTM E488.

6. Expansion Anchors Approved for Use in Solid Grouted Masonry:
   a. Wedge style anchor.
   b. Hilti Kwik Bolt TZ2 (ICC-ESR 4561).
7. Screw Style Anchors Approved for Use in Solid Grouted Masonry:
   a. Hilti Kwik HUS EZ (ICC-ESR 3056).

B. Anchors that Resist Loads Through an Injectable Chemical Adhesive:
1. In Concrete: Hilti HIT HY 200 Safe Set.
2. In Solid Grouted Masonry: Hilti HIT-HY 270.
3. In Hollow Brick or Hollow Masonry: Hilti HIT-HY 270 with screen tubes.
4. Anchored Material: Carbon steel or stainless steel threaded rods or deformed reinforcing bars as specified herein or as indicated on the Drawings.
5. Bonding Strength: Tested in accordance with ASTM E1512.
6. If installation temperatures of base materials fall below 41 degrees F, review cold weather applications with Manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Pre-Construction Conference:
1. At least 15 days prior to the installation of post-installed anchors, conduct a pre-installation conference at the Site.
   a. Repeat pre-installation conference as many times as is necessary to address all installers using post-installed anchors on the Project.
2. Contractor shall be responsible for arranging the conference and agenda.
3. Agenda shall include, but not be limited to:
   a. Reviewed and approved post-installed anchors for use in the Project.
   b. Anchor installation training (to be performed by Manufacturer’s representative).
   c. Drilling requirements and restrictions for the anchors.
   d. Special inspection requirements.

3.2 INSTALLATION

A. Install post-installed anchors:
1. In strict accordance with the installation instructions supplied by the Manufacturer.
2. In rotary hammer drilled holes, unless otherwise approved by Engineer.
3. In drilled out holes of the proper depth and diameter cleaned of dust and debris according to the Manufacturer’s specific installation instructions.

B. Provide sizes, spacings, edge distances and embedment as indicated on the Drawings.

C. Anchors that Resist Loads Through an Injectable Chemical Adhesive:
1. Install in concrete with minimum age of 21 days, and in masonry with a minimum age of 7 days.
2. Do not apply load until adhesive has properly cured and developed specified strength where cure time shall be as called out in the Manufacturer’s literature based on prevailing environmental conditions at the time of installation.

3.3 CLEANING

A. Clean materials installed under this Section according to Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 03 15 16

SECTION 03 30 03 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of formwork, reinforcement and concrete.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standard Specifications, Test Methods, and Classifications:
      a. A185 - Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
      b. A615 - Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement.
      c. C33 - Specification for Concrete Aggregates.
      d. C94 - Specification for Ready-Mixed Concrete.
      e. C150 - Specification for Portland Cement.
      f. C260 - Specification for Air-Entraining Admixtures for Concrete.
      g. C309 - Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
      h. C494 - Specification for Chemical Admixtures for Concrete.
      i. C989 - Specification for Slag Cement for Use in Concrete and Mortars.
   2. ACI - American Concrete Institute:
      a. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
      b. ACI 301 - Specifications for Structural Concrete for Buildings.
      c. ACI 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete.
      d. ACI 305R - Hot Weather Concreting.
      e. ACI 306R - Cold Weather Concreting.
      f. ACI 309R - Guide for Consolidation of Concrete.
      g. ACI - 318 - Building Code Requirements for Reinforced Concrete.
      h. ACI 347R - Guide to Formwork for Concrete.
   3. MDOT Publications:
      a. Standard Specifications for Construction.
      b. Standard Plans.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Formwork: The design and engineering of formwork, as well as its construction, shall be the responsibility of Contractor.

1.5 SUBMITTALS

A. Shop Drawings: For reinforcing steel.

B. Mix Designs: Submit concrete mix design for review prior to placing concrete.

1.6 QUALITY ASSURANCE

A. Testing of concrete: In accordance with Division 01 Section “Special Inspections and Tests.”

PART 2 - PRODUCTS

2.1 MATERIALS

A. Formwork:
1. Form grade plywood or metal panels; no torn edges or worn plywood.
2. Form Release Agent:
   a. Non-staining, non-emulsifiable type.
3. Form ties, spreaders and accessories.
4. Provide chamfered strips in exposed corners of concrete.

B. Reinforcement:
1. Reinforcing Bars:
   a. ASTM A615.
   b. Yield Stress: F_y = 60,000 psi, Grade 60.
2. Accessories resting on surfaces to be left exposed as finished surfaces shall have plastic or epoxy coated legs.

C. Concrete Materials:
1. Portland Cement: ASTM C150, Type I.
2. Fly Ash: Not permitted.
3. Ground-Granulated Blast Furnace (GGBF) Slag: ASTM C989, Grade 100 or 120.
4. Fine and Coarse Aggregates:
   a. Inert, non-chemically reactive, and non-radioactive.
   b. Shall not contribute components that would be detrimental to drinking water quality.
   c. ASTM C33.
5. Water: Clean, fresh and potable.
6. Air-Entrainment: ASTM C260.
7. Water Reducing Agents: ASTM C494.
8. No calcium chloride allowed in materials used in concrete mix.
9. Membrane Curing Compounds: ASTM C309.

D. Waterproof Bead:
1. Waterstop RX by CETCO; or equal.
2. 3/4-inch x 3/8-inch.

E. Manhole Steps:
1. Provide either cast iron or plastic.
2. Cast Iron:
   a. Model 8509 by East Jordan Iron Works; Model R-1980-J by Neenah Foundry Company; or equal.
   b. Minimum Dimensions: 10 inches deep by 14 inches wide, 5-inch tread depth, 1-inch x 1-inch tread section with 2-inch rail height.
3. Plastic:
   a. PS2-PF as manufactured by M.A. Industries, Inc. Peachtree City, GA; or approved equal.
   b. Copolymer polypropylene plastic manhole steps with Grade 60 No. 4 reinforcing bar core.
   c. Grip Width: 14 inches.
   d. Grip Depth: 6 inches.

2.2 CONCRETE MIXES

A. Proportioning:
1. Proportions of materials for concrete shall be in accordance with ACI 211.1.
2. Mix Design 1:
   a. Minimum Design Compressive Strength: 4,000 psi.
   b. Minimum Cementitious Content: 5.5 sacks.
   c. Replacement of Cement by Slag: 30% to 40%.
   d. Water-Cementitious Ratio: 0.45 maximum.
   e. Slump Limits: 7 inches ± 1-inch.
   f. Entrained Air Content: 6% ± 1%.

2.3 SOURCE QUALITY CONTROL

A. Production and Delivery:
   1. Ready mixed concrete shall be batched, mixed and transported in accordance with ASTM C94.
   2. Ready-mix delivery tickets shall be furnished with each batch of concrete before unloading at the Site, on which is printed, stamped or written the following information:
      a. Name of ready-mix batch plant.
      b. Serial number of ticket.
      c. Date and truck number.
      d. Name of Contractor.
      e. Job name and location.
      f. Specific class of designation of concrete.
      g. Amount of concrete (cubic yards).
      h. Time loaded or of first mixing of cement and aggregates.
      i. Type, name and amount of admixture.

PART 3 - EXECUTION

3.1 ERECTION AND PLACEMENT

A. Forms:
   1. Provide required forms, shores, bracing, breast timbers, form ties and accessories in sufficient quantities so as not to delay the work.
   2. Coordinate work with other trades for the installation of embedded items and form penetrations.
   3. Form Removal:
      a. No earlier than 3 days for walls.
      b. No earlier than 7 days for slabs.

B. Reinforcement:
   1. Steel reinforcement, at the time concrete is placed around it, shall be free from rust scale, loose mill scale, oil, paint and other coatings which will destroy or reduce bond between steel and concrete.
   2. Notify special inspector at least 24 hours prior to concrete pour for final check of reinforcing placement.

C. Waterproof Bead:
   1. Install in joints at last convenient time of accessibility.
   2. Apply in strict accordance with Manufacturer's instructions.

D. Concrete:
   1. Handle concrete from mixer to place of final deposit in carts, buggies or conveyors.
   2. Compact concrete by mechanical vibration equipment, but do not transport concrete through forms by vibrating.
   3. Wall Finish: As cast, smooth formed.
   4. Slab Finish:
      a. Exterior Slabs: Light broomed finish unless specified otherwise.
   5. As soon as possible after finishing or removing forms, treat surfaces with a liquid membrane-forming curing compound unless specified otherwise.
   6. Protect freshly placed concrete from damage due to extreme temperatures in accordance with ACI 305R and ACI 306R.

END OF SECTION 03 30 03

SECTION 04 20 00 – UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete block.

B. Mortar.

C. Anchorage.

1.2 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS (CMU)

A. Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   2. ASTM C90.
      a. Hollow block.
      b. Exposed Faces: Manufacturer's standard color and texture where indicated.

2.2 MORTAR MATERIALS

A. Masonry Cement: ASTM C91, Type N.

B. Portland Cement: ASTM C150, Type I.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144.

E. Water: Clean and potable.

F. Accelerating Admixture: Nonchloride type for use in cold weather.

G. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

H. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714 and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type N.
   2. Color: Standard gray.

I. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
   1. Type: Fine.

2.3 REINFORCEMENT AND ANCHORAGE

A. Single Wythe Joint Reinforcement: ASTM A951.
   1. Type: Ladder.
   2. Material: ASTM A1064 steel wire, hot dip galvanized after fabrication to ASTM A153 Class B.
   3. Size: 0.1483-inch side rods with 0.1483-inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

B. Strap Anchors: Bent steel shapes, 1-1/2-inch width, 0.105-inch thick, 8-inch length, with 1-1/2-inch long, 90-degree bend at each end to form a U or Z shape or with cross pins, hot dip galvanized to ASTM A153 Class B.

2.4 MORTAR MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
   1. Type N.

B. Admixtures: Add to mixture at Manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

C. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are available, and ready for roughing into masonry work.

3.2 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.3 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Struck flush.

3.4 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar and mortar smears as work progresses.

D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to fall into reservoir venting chase.

3.6 REINFORCEMENT AND ANCHORAGE

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement in each joint.

B. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8-inch mortar cover on each side.

C. Fasten anchors to sides of opening and embed in masonry joints as masonry is laid.

D. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8-inch mortar cover to the outside face of the anchor.

3.7 BUILT-IN WORK

A. As work progresses, install sleeves furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Do not build into masonry construction organic materials that are subject to deterioration.

3.8 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

3.9 CUTTING AND FITTING

A. Cut and fit units to set sleeves solidly in mortar.

3.10 CLEANING

A. Remove excess mortar and mortar droppings.

B. Clean soiled surfaces with cleaning solution.

C. Use non-metallic tools in cleaning operations.

3.11 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 20 00

SECTION 05 50 00 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing, fabrication and erection of metal fabrications, including the major items listed below:
   1. Beams, angles and other steel supporting grating including connections.
   2. Ladders.
   3. Galvanizing of selected items.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the pertinent provisions of the following:
   1. ASTM Standard Specifications:
      a. A36 - Structural Steel.
      b. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
      c. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
      d. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
      e. A276 - Stainless Steel Bars and Shapes.
      f. A307 - Carbon Steel Bolts and Studs, 60,000 psi, Tensile Strength.
      g. A325 - Structural Bolts, Heat-Treated, 120/105 ksi Minimum Tensile Strength.
      h. A366 - Commercial Steel (CS) Sheet, Carbon (0.15 Maximum Percent), Cold-Rolled.
      i. A490 - Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
      j. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
      k. A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
      l. A563 - Carbon and Alloy Steel Nuts.
      m. A780 - Standard Practice for Repair of Damaged Hot-Dip Galvanized Coatings.
      n. A992 - Steel for Structural Shapes for Use in Building Framing.
      o. B209 - Aluminum and Aluminum Alloy Sheet and Plate.
      p. B221 - Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, & Tubes.
      q. B633 - Electro-deposited Coatings of Zinc on Iron and Steel.
      r. D520 - Zinc Dust Pigment for Paint.
      s. F436 - Hardened Steel Washers.
      t. F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs.
      u. F594 - Stainless Steel Nuts.
      v. F1554 - Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength.
   2. AISC publications:
      a. Code of Standard Practice for Steel Buildings and Bridges.
      b. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
      c. Detailing for Steel Construction.
      d. Manual of Steel Construction.
      e. Specification for Structural Joints Using ASTM A325 or A490 Bolts.
   3. AWS publications:
      a. ANSI/AWS A5.1 - Carbon Steel Electrodes for Shielded Arc Welding.
      b. ANSI/AWS A5.3 - Aluminum and Aluminum Alloy Electrodes for Shielded Arc Welding.
      c. ANSI/AWS A5.4 - Stainless Steel Electrodes for Shielded Arc Welding.
      d. ANSI/AWS D1.1 - Structural Welding Code - Steel.
      e. ANSI/AWS D1.2 - Structural Welding Code - Aluminum.
      f. ANSI/AWS D1.6 - Structural Welding Code - Stainless Steel.
   4. American Hot-Dip Galvanizers Association.
   5. Occupational Safety and Health Act.

6. NAAMM - National Association of Architectural Metal Manufacturers.
7. The Aluminum Association.

1.4 CONNECTION DESIGN REQUIREMENTS

A. Fabricator:
   1. Responsible for the selection of connections details except those specifically indicated on the Drawings as Engineer designed.

B. General Types of Connections: Indicated on Drawings.

C. Connections:
   1. Equal to standard framing connections in accordance with AISC - Manual of Steel Construction.
   2. Minimum Load Connection:
      a. Two 3/4-inch diameter bolts, or
      b. Welds with a total capacity of 6,000 pounds.
   3. Beam connections shall be designed for a shear capacity equal to the greater of the following:
      a. 1/2 the total allowable uniform load capacity of the beam in accordance with the AISC Manual of Steel Construction, Section 2, or
      b. The actual shear load due to the combination of all loads.
   4. Connections: Bolted bearing type unless indicated otherwise on Drawings.

1.5 SUBMITTALS

A. Shop Drawings: For all members to be furnished to include:
   1. Detail Drawings of Members and Connections:
      a. In accordance with AISC - Detailing for Steel Construction.
      b. Size and number of bolts.
      c. Dimensions.
      d. Connection angles and plates.
   2. Erection Drawings: Locate and identify members.
   3. Welding: In accordance with AWS welding symbols.
   4. Type of paint.
   5. Item to be galvanized.

B. Provide setting drawings, templates and directions for the installation of anchor bolts and other devices.

1.6 QUALITY ASSURANCE

A. Fabrication and Erection Personnel Qualifications:
   1. Trained and experienced in the type of work being performed.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

B. Welders, Welding Operators and Tackers Qualifications:
   1. Qualified by tests in accordance with AWS D1.1.

C. Steel Fabricators:
   1. Certified under the AISC Quality Certification Program for Category I - Conventional Steel Structures, or under other quality control program acceptable to building official in accordance with building code, prior to fabrication.
   2. The quality control program shall permit work on fabricator’s premises without special inspection.

D. Special Inspection of Steel Erection: In accordance with Division 01 Section “Special Inspections and Tests.”

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated or distorted material and immediately remove from the Site. Replace rejected materials with new material at no additional cost to Owner.

D. Embedded Items:
   1. Includes anchor rods and other anchorage devices which are to be embedded in cast-in-place concrete or masonry.
   2. Delivered on the Project Site in time to be installed before the start of cast-in-place concrete or masonry operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Materials shall be new, top quality of their respective kinds, standard sizes and fabricated in a shop whose principal business is manufacturing the items specified in this Section.

B. Steel:
   1. Wide Flange and WT Shapes: ASTM A992 with yield stress of 50,000 psi.
   2. M, S, MT and ST Shapes, Channels, Angles, Bars, Plates and Rods: ASTM A36 with yield stress of 36,000 psi.
   3. Rectangular and Square Tubular Shapes: ASTM A500, Grade C with yield stress of 50,000 psi.
   4. Round Tubular Shapes: ASTM A500, Grade B with yield stress of 46,000 psi, or ASTM A53 with yield stress of 35,000 psi.

C. Aluminum Sheet: Aluminum alloys and tempers shall be of uniform quality and free from injurious defects and shall meet the properties of ASTM B209.

D. Extruded Aluminum: Aluminum alloys and tempers shall be of uniform quality and free from injurious defects and shall meet the properties of ASTM B221.

E. Stainless Steel Bars and Shapes: ASTM A276.

F. Paint: In accordance with Division 09 Section “Painting.”

2.2 METAL FABRICATIONS

A. Ladders:
   1. Aluminum:
      a. Width: 16-inches.
      b. Side Rails: 3-inch x 3/4-inch minimum bar.
      c. Rungs: 1-inch diameter minimum, 12 inches on center.
      d. Extruded aluminum in accordance with ASTM B221, Temper 6061-T52, AA M12C22A31, clear anodized finish.
      e. Comply with Aluminum Association’s “The Aluminum Design Manual.”

B. Fasteners:
   1. Bolts:
      a. Use carbon or alloy steel, ASTM A325 3/4-inch diameter bolts or larger as required by connection design.
      b. Use ASTM A490 3/4-inch diameter bolts or larger only if required by connection design.
      c. If conditions require that galvanized materials be used, use ASTM A307 or A325 bolts. Do not galvanize A490 bolts, as that could possibly cause hydrogen embrittlement, and will affect hardness.
      d. Stainless steel: ASTM F593, used where conditions of severe corrosion could occur.
   2. Nuts:
      a. Carbon Steel: ASTM A563.
      b. Stainless Steel: ASTM F594.
   3. Washers:
      a. Hardened Steel Washers: ASTM F436.

C. Anchors: In accordance with Division 03 Section “Post-Installed Anchors”.

D. Anchor Rods: ASTM F1554, Grade 36.

E. Other Materials: Other materials not specifically described but required for a complete and proper installation of the work of this Section, shall be new, first quality of their respective kinds, and as selected by Contractor subject to approval of Engineer.

2.3 FABRICATION

A. General:
1. Workmanship: Install items square and level, accurately fitted and free from distortion and defects.
2. Temporary Bracing:
   a. Make provision for erection stresses by temporary bracing.
   b. Keep work in alignment.
3. Welding:
   a. Steel welding shall be performed in accordance with AISC Specification and AWS D1.1.
   b. Do not weld galvanized steel. Use bolted connections.
   c. Filler metal requirements for steel welding processes shall be in accordance with AWS D1.1 and AWS A5.1.
   d. Aluminum welding shall be performed in accordance with AWS D1.2.
   e. Filler metal requirements for aluminum welding processes shall be in accordance with AWS A5.3.
   f. Stainless steel welding shall be performed in accordance with AWS D1.6.
   g. Filler metal requirements for stainless steel welding processes shall be in accordance with AWS A5.4.
   h. Welding shall be continuous along entire area of contact.
4. Painting: Prime paint metal fabrications in accordance with Division 09 Section “Painting.”
5. Items fabricated from structural steel members which are to be architecturally exposed shall be given special attention for material selection with respect to rolling tolerances, surface finish and straightness.
6. Normal structural steel fabrication tolerances will not be acceptable where in conflict with the intent and requirements of this Section.
7. Curved beam sections shall be fabricated without distortion to top and bottom flange width and thickness.
8. Straightness tolerances, additive to deflection, shall not exceed ± 1/16-inch to 10 feet.
9. Cope, miter, and butt caps on exposed surfaces shall be made to the closest possible tolerances consistent with metal shop equipment and practice in order to provide a pleasing appearance.
10. Fastening shall be concealed where practicable. Thickness or metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

B. Galvanizing:
1. Hot-dipped galvanized after fabrication in accordance with ASTM A123.
2. 2 oz/ sq ft minimum.
3. Galvanize the following items: All items provided under this Section.

C. Galvanized Fasteners:
1. Hot-dipped galvanized after fabrication in accordance with ASTM A153.
2. Class C (1.25 oz/sq ft) minimum coating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Workmanship: Install items square and level, accurately fitted and free from distortion and defects.

B. Erection:
1. Bracing:
   a. Provide all shoring, bracing and accessories required for complete erection.
   b. Safety and adequacy of bracing and temporary bracing are the responsibility of the Contractor.

C. Coordination: Supply to appropriate trades items to be cast into concrete or embedded in masonry, complete with necessary setting templates.

D. Tightening:
   1. Tighten bolts snug-tight as defined by AISC, unless otherwise noted on the Drawings.
   2. Tighten bolts in slotted holes using the AISC Turn-of-the-Nut Method, unless indicated otherwise on the Drawings.
   3. Where specifically indicated on the Drawings, finger-tighten nuts in connections where movement must be permitted, and tighten a jam nut over finger-tightened nut, or peen bolt threads, to prevent nut backoff.

E. Touch-up:
   1. After erection is complete, touch up all shop priming coats damaged during transportation and erection.
   2. Prime all field welds, bolt heads, nuts and abrasions using the priming paint specified for shop priming.
   3. Touch up all damaged galvanized areas with a zinc rich paint meeting ASTM D520 and ASTM A780.

F. Welding: Field welding shall be performed to the same standards and requirements of shop welding.

G. Protection: Where required, provide approved protection against galvanic action between contacts of dissimilar metal or situations that will cause deterioration of metal in contact or associated in any way.

3.2 CLEANING

A. Prior to acceptance of the work of this Section, thoroughly clean all installed materials and related areas in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 05 50 00

SECTION 05 53 00 – METAL GRATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of all gratings and related equipment.

1.3 REFERENCES

A. Except as herein specified or as indicated in the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standard Specifications:
      a. A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
      b. A569 - Steel, Carbon (0.15 Maximum, Percent) Hot-Rolled Sheet and Strip Commercial Quality.
      c. A780 - Repair of Damaged Hot-Dip Galvanized Coatings.
      d. D520 - Zinc Dust Pigment for Paint.
   2. NAAMM - National Association of Architectural Metal Manufacturers:
      a. Metal Bar Grating Manual.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Design Criteria:
   1. Live Load: 100 psf.
   2. Allowable Deflection: 1/4-inch.

1.5 SUBMITTALS

A. Shop Drawings: For grating to include:
   1. Dimensions.
   2. Required field measurements.
   3. Materials.
   4. Bearing bar sizes.
   5. Grating layout.
   6. Openings for penetrations.
   7. Load and deflection tables.

1.6 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Steel Grating:
   1. Weldforged, by IKG Industries.
   2. Light duty welded, by Ohio Gratings, Inc.
   3. Or equal.

2.2 MATERIALS

A. Steel Grating:
   1. ASTM A569.
   2. Finish: Galvanized in conformance with ASTM A123.
   3. Surface: Smooth.
   4. Type: Welded.

B. Grating Anchorage:
   1. Manufacturer's standard saddle clips, 4 per panel.
   2. Bolts:
      a. Self-drilling into steel.
      b. Expansion bolts into concrete.
      c. Adhesive anchors into concrete.

C. Other Materials: Other materials not specifically described but required for a complete and proper installation of the work of this Section shall be new, first quality of their respective kinds, and as selected by Contractor subject to the review of Engineer.

2.3 FABRICATION

A. Minimum Size:
   1. Bearing Bars: To match existing, with bar spacing to meet the load capacity and defection criteria.
   2. Cross Bars: 4 inches on center.

B. Banding:
   1. Band grating ends.
   2. Band grating edges where bearing bar layout does not coincide with the edge of the grating.
   3. Banding:
      a. Flat bar 1/8-inch less in depth than bearing bar depth.
      b. Keep banding flush with top surface of grating.

C. Penetrations: Band edges of openings greater than 3 inches.

D. Panels:
   1. Grating panels shall be of uniform size and layout with uniform consistency in joint spacing fastener layout and alignment of joints.

2.4 SOURCE QUALITY CONTROL

A. Reject grating panels with warpage causing greater than 1/16-inch difference in top elevation between adjacent panels.

B. Replace with new materials meeting the requirements of this Section.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install grating in conformance with:
   1. The Shop Drawings reviewed by Engineer.
   2. The Manufacturer's recommendations.

B. Touch up damaged galvanized areas with a zinc rich paint meeting ASTM D520 in accordance with ASTM A780.

3.2 FIELD QUALITY CONTROL

A. Remove defective work and replace with materials that meet Specification requirements.

3.3 CLEANING

A. Clean materials installed under this Section in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 05 53 00

SECTION 05 60 10 – ELEVATED STEEL WATER TANK MISCELLANEOUS REPAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. Any details, techniques or methods not specifically mentioned, but obviously required to meet the specifications, their intent and accepted trade practices shall be used to produce a first-class job and shall be considered incidental to the work.

B. The Contractor shall provide and furnish all labor, materials, tools and equipment to complete the work as described. The work includes the following:
   1. Manchester Road Tank
      a. Replace roof hatch.
      b. Furnish and install fall prevention to wet interior ladder.
      c. Replace access tube gasket.
      d. Replace internal vent screen.
      e. Replace overflow pipe screen.
      f. Furnish and install cathodic protection system.
   2. North Campus Tank
      a. Replace internal vent screen and tighten vent bolts.
      b. Replace overflow pipe screen.
      c. Furnish and install roof hatch gasket.
      d. Abrasive blast clean and repaint dry interior including valve vault.
      e. Replace insulation.
      f. Spot blast, brush blast and repaint wet interior roof and upper access tube.

1.3 EXISTING CONDITIONS

A. Manchester Road Tank:
   1. Tank erection date: 1959.
   2. Capacity: 500,000-gallon.
   3. Tank design: CBI Spheroid.
   4. Height to low water line:106.5 feet.
   5. Google map coordinates: 42.25729, -83.70996.
   6. Interior coating type: Epoxy.
   7. Exterior coating type: Polyurethane.
   8. Dry interior coating type: Epoxy.

B. North Campus Tank:
   1. Tank erection date: 2002.
   2. Capacity: 500,000-gallon.
   3. Tank design: CBI Spheroid.
   4. Height to low water line: 156 feet.
   5. Google map coordinates: 42.30275, -83.69823.
   6. Interior coating type: Epoxy.
   7. Exterior coating type: Polyurethane.
   8. Dry interior coating type: Epoxy.

1.4 DEFINITIONS

A. SSPC - Society of Protective Coatings.

B. NACE - National Association of Corrosion Engineers.

C. ASTM - American Society for Testing Materials.

D. OSHA - Occupational Safety and Health Administration.

E. AWWA - American Water Works Association.

F. AWS - American Welding Society.

G. ASME - American Society of Mechanical Engineers.

H. AISC - American Institute of Steel Construction.

I. API - American Petroleum Institute.

1.5 SUBMITTALS

A. Provide submittals to the Engineer upon request in accordance with the General Conditions.

B. Certify that the Contract Specifications have been satisfied and the Contractor's obligations have been met.

C. Submittals shall include but are not limited to the following:
1. Material invoices.
2. Progress schedule.
3. Shop drawings.
4. Product data.
5. Samples.
6. Worker certifications.
7. Waste manifests.
8. Permits.

D. Make submittals in such sequence as to cause no delay in the work or the work of others.

E. No damages will be awarded or extension of time granted due to the submittal review process.

F. Make all corrections or changes in the submittals required by the Engineer and resubmit.
1. Indicate any changes that have been made other than those requested by the Engineer.
2. Present in a clear and thorough manner all shop drawings and product data.
3. Depict dimensions and clearances on shop drawings with details referencing the Contract Specification.
4. Modify or supplement Manufacture’s standard product data sheets to provide information specifically applicable to the work.

1.6 QUALITY CONTROL AND ASSURANCE

A. Maintain quality assurance programs prior to, during and through full completion of the work.

B. Foreman shall perform quality control inspections for all aspects of the work.

C. Foreman shall make these inspections prior to the inspectors scheduled visit.

1.7 INSPECTION AND TESTING

A. Inspection and testing are essential to the proper execution of the work. Tank inspections shall be coordinated by the Contractor and paid for through Allowances for inspection. Inspection and testing not specifically mentioned shall be done by generally accepted methods, unless otherwise specified by the Engineer. Assistance for the inspections shall be considered incidental to the work. The Contractor shall comply with the following:
1. Notify the Engineer that an inspection interval has been reached.
2. Provide the Engineer with a written progress schedule for establishing inspection intervals that meets the Engineer's requirements.

3. Provide the Engineer with 48-hour notification of any expected change in schedule, including weather delays.
4. Provide safe access to the work in the form of scaffolding, rigging, etc. and personnel for operation of such to assist in expediting each inspection.
5. Halt all work in the immediate area of the inspector until such time as the inspection has been completed.
6. Contractor shall pay all costs for inspections where:
    a. Inspection interval has not been met.
    b. Defective work requires additional visit.
    c. Poor scheduling or communication results in extra inspection visit.

1.8 DELIVERY, STORAGE AND HANDLING

A. Provide transportation, delivery, unloading and handling of equipment and materials to the site in an undamaged condition and on schedule to avoid delays.

B. Materials and equipment shall be delivered in:
1. Original containers.
2. Packaging with labels intact and legible.

C. Materials and equipment shall be unloaded and handled by:
1. Trained personnel and equipment at the site to prevent damage.
2. Methods and at designated lifting points to prevent overstressing or permanent damage.

D. Provide suitable storage for equipment and materials immediately upon delivery.
1. Store products subject to damage by elements in accordance with Manufacturers' recommendations.
2. Provide protection to all installed materials and equipment as necessary to prevent damage from subsequent work.

E. Remove or replace materials or equipment, at Contractor’s expense, damaged during the following:
1. Transportation
2. Handling
3. Storage
4. Installation
5. Subsequent operations

F. Provide protection of installed materials and equipment to prevent damage from subsequent performance of the work.

1.9 COORDINATION

A. Coordinate work in the Project area with:
1. Subcontractors.
2. Utility companies if any.
3. All other contractors.

B. Use typical construction sequencing practices to avoid interference and delays in the areas with common construction activities.
1. Perform all weld and structural repairs prior to painting.

1.10 COOPERATION

A. Conduct operations in such a manner that minimize interference with other contractors, utilities or any public agency on or near the construction site.

B. Cooperate with such other parties to cause as little interference as possible with their operations.

C. Do not conduct operations when local restrictions on working hours, weekend and holiday work are in effect.

D. No additional compensation shall be provided to the Contractor for delays or interference due to the operations of such parties.

E. Owner reserves the right to conduct other work by itself or through contract.

1.11 WORK ACCESS AND RIGGING

A. Contractor shall provide sufficient rigging and equipment necessary for the proper execution of the work.

B. Equipment, rigging, staging and scaffolding shall conform to the requirements as set forth by OHSA Construction Standards.

C. Rigging shall allow for close access for the work to allow full execution of the work and close examination for inspection.

D. Any modifications to the structure shall require prior approval from the Engineer.
   1. When approved, openings cut shall incorporate threaded couplings welded completely with plugs to be installed upon completion.

E. Scaffolding shall be constructed in accordance with the manufacture's recommendations in regard to height and width and with OSHA 1926.451.
   1. Height to width ratio shall not exceed 4:1 without other provisions installed.

1.12 PROTECTION OF NONWORK AREAS

A. Protect all areas not subject to modification during the work. The Contractor shall provide protection for but not limited to:
   1. Level controls.
   2. Electrical panels, conduit, outlets, lighting and junction boxes.
   3. Cathodic protection systems.
   4. Insulation.
   5. Fall prevention equipment.
   6. Antennae.
   7. Motors, pumps, seals and bearings.
   8. Gaskets.
   9. Screens.
   10. Gauges and level indicators.

B. Mask, tape, tarp or use other appropriate means to protect all surfaces or appurtenances not subject to alteration, including adjacent personal or private property.

C. Make corrections to the satisfaction of the Owner of the damaged property, if damage occurs. If the damaged cannot be corrected by cleaning, the Contractor shall incur the costs for replacement of the damaged property.

D. Notify the Engineer or Owner for a determination prior to execution of the work if a question exists on whether an item requires protection.

1.13 WATER SEEPAGE

A. Furnish and install temporary pipe plugs and drains in the event water seepage occurs from inlet or outlet.
   1. The plugs shall provide complete water stoppage or shall allow the bypass of water to an appropriate drain.
   2. Bypass pipe plugs shall be Cherne Muni-Ball or equivalent.
   3. Furnish drain piping.

1.14 DISINFECTION

A. Contractor:
   1. Disinfect tank in accordance with AWWA method #3 (C-652), latest revision.
   2. Collect water samples at specified intervals for bacteriological testing in accordance with rules and procedures of State Health Department, EGLE or EPA, whichever has jurisdiction.
   3. Two consecutive water samples taken 24 hours apart are required for bacteriological analysis.
   4. Pay for all direct and indirect costs for disinfection, sampling and testing including such additional measures required if the samples fail test.

B. Owner:
   1. The Owner will waste the first full tank of water, per the permit requirements, or per the governing agency.
   2. The chlorinated water will be wasted and dechlorinated prior to discharge to any surface water body, sewer or drain.

1.15 REPAIR OF DEFECTS

A. Repair all defects as marked by the Engineer and in accordance with AWWA D-100 and the Contract Specifications. All repairs shall be completed in accordance with these specifications and subject to the same quality and with the same restrictions as if completed initially.
   1. Correct or repair to permissible limits the following defects:
      a. Berries.
      b. Craters.
      c. Undercut.
      d. Porosity.
      e. Incomplete welds.
   2. Remove construction lugs and grind welds flush.
   3. Reweld gouged steel or arc strikes and grind flush.
   4. All welds which are an integral part of the design shall be ground smooth to remove:
      a. Slag.
      b. Spatter.
      c. Sharp edges.
      d. Excessive reinforcement.
   5. The Engineer reserves the right to request additional tests if more than 20% of the radiographs fail.

1.16 WARRANTY

A. Provide a full warranty on all materials and workmanship for the period of one year after the finalization of the Contract.
   1. Repair all defects in materials or workmanship, at no expense to the Owner, discovered within the above-mentioned time frame.
   2. Pay for all indirect costs incurred by the Owner due to such repairs to include but are not limited to:
      a. Utility expenses.
      b. Direct labor costs.
      c. Subsequent inspections.
      d. Consulting fees.
      e. Equipment rental.
   3. The costs associated with the one-year inspection, if performed, will be assumed by the Owner.
   4. Warranty repairs, if necessary, shall be performed in accordance with these specifications and subject to the Engineer's approval.

PART 2 - PRODUCTS

2.1 FABRICATION

A. All steel used in fabrication shall meet or exceed AWWA D-100 standards (latest revision) for each intended use. Materials and equipment delivered to the site shall be new and in good condition.

2.2 MATERIAL SCHEDULE

A. Steel Plate:
   1. ASTM A36.
   2. A283 Grades A, B and C.

B. Bolts and Pins: ASTM A307.

C. Check Valve:
   1. Crane Regrinding Bronze Swing, 2-1/2-inch.

D. Electrodes:
   1. E70XX.

E. Structural Steel Shapes, Bar Stock and Rods: ASTM A36.

F. Fall Prevention Device:
   1. DBI-SALA Lad-Saf Cable Ladder System, galvanized.
      a. Detachable Sleeves: DBI Sala 6160054 Lad-Saf X3.
      b. Provide two.

G. DBI-SALA Climbing Harness:
   1. Delta Cross – over style positioning/climbing harness.
      a. Provide two.
      b. Universal (1110725).
   2. Provide two dual lanyards with large J-hooks.
      a. 3M Protecta Pro-Stop shock absorbing (1340250).

H. Access Tube Gasket:
   1. Neoprene, 1/4-inch

I. Overflow or Vent Screening:
   1. Suppliers
      a. McMasters-Carr (9481T12)
   2. Stainless steel wire mesh
      a. Opening Size: 24 mesh
      b. Wire diameter: 0.014-inch.

J. Hatch Gasket:
   1. Approved Manufacturers:
      a. McMaster-Carr.
   2. Water- and Weather-Resistant Rubber.
   3. Push-on seal with bulb on top, hollow, for 1/4-inch edge, 3/8-inch wide.

K. Insulation:
   1. Owens Corning Trymer 2000
   2. 2-inch

L. Frost Jacket:
   1. Childers, smooth or stucco finish
   2. 0.016-inch-thick aluminum

M. Insulation Tape:
   1. Shurtape MB 100 insulation tape.

PART 3 - EXECUTION

3.1 INSTALL 2-1/2-INCH CHECK VALVE ON CONDENSATE DRAIN (Manchester Tank)

A. Remove drain as needed and dispose.
   1. Butt weld opening in basebell shut with steel plug.

B. Furnish and install a new 2-1/2-inch diameter drain for the condensate platform:
   1. Install in the lowest settlement area of the platform as determined in the field.
   2. Slope drain down to overflow pipe.
   3. Furnish piping and fittings to connect to valve.
   4. Paint in accordance with Division 09 Section “Steel Coatings.”

3.2 REPLACE WET INTERIOR ROOF HATCH (Manchester Tank)

A. Replace roof hatch
   1. Remove existing hatch and adjacent corroded roof plate (2 inches).
   2. Install new one - two-inch-wide roof hatch collar plate.
      a. Use 1/4-inch plate.
      b. Plate shall match roof, access tube and compression ring curvature.
      c. Plate shall be butt welded in place on both sides and ground flush.

B. Install new 30-inch diameter hatch, with cover and external hasp.
   1. Cover:
      a. Designed with 2-inch overlap ring.
      b. Provide external locking hasp.
      c. Hinged with an external stop to prevent opening greater than 120 degrees.
      d. Hinges: 3/8-inch plate.
      e. Bolts: 3/4-inch x 1-1/2-inch with non-locking nut.
      f. Provide external handhold 180 degrees from hinges.
   2. Hatch Frame:
      a. 30-inch diameter X 1/4-inch.
      b. 4-inch height.
   3. All exterior exposed hatches shall be rain proof.

C. Paint in accordance with Division 09 Section “Steel Coatings.”

3.3 INSTALL FALL PREVENTION DEVICE ON WET INTERIOR LADDER (Manchester Tank)

A. Furnish and install a cable type fall prevention device on the tank’s wet access tube ladder.

B. Install per manufacture’s recommendations.

C. System shall include:
   1. Top shock absorbing bracket.
   2. Bottom bracket.
   3. Aircraft cable.
   4. Intermediate cable guides.
   5. Two detachable cable safety sleeves (Lad-Saf X3).
   6. Two safety harnesses each with a 5-foot lanyard and two self-locking carabiners.

3.4 ACCESS TUBE GASKET AND BAND REPLACEMENT (Manchester Tank)

A. Tank vents around the access tube through the roof shell.

B. Remove existing screen.

C. Furnish and install new gasket to vent area in horizontal position.

D. Furnish and install new retaining bands (2) bolting in place.

E. Replace bolts as necessary.

F. Paint in accordance with Division 09 Section “Steel Coatings.”

3.5 VENT SCREEN REPLACEMENT (Manchester & North Campus Tanks)

A. Engineering Basis:
1. Existing vent is an18-inch vacuum relief style vent. The flow in and out of the tank is restricted by the inlet pipe, which is 18-inches in diameter. The open area of the vent (254 square-inches) equals the open area of the inlet pipe (254 Square-inches), the air exchange rate of the vent will equal the requirements of the tank.
2. Based on the calculations below, a 24-mesh screen does not restrict the operation of the vent:
3. Effective vent area (18-inch Dia.) = 3.14 x $(9)^2$= 254 square inches.
4. Vent screen area (31-inch Dia.) = 3.14 x $(15.5)^2$ = 754 square inches.
5. Effective open screen area = 0.44 x 754 square inches = 331 square inches.
a. 331>254; therefore, the vent is not restricted by the screen.

B. Execution
1. Remove existing internal screen from vent.
2. Replace screen with 24 mesh screen using existing fasteners.
3. Install in a horizontal position.
4. Tighten loose bolts on vent flange

3.6 ROOF HATCH GASKET INSTALLATION (Manchester & North Campus Tanks)

A. Install new rubber edge seal gasket to roof hatch.
1. All exterior exposed hatches shall be rain proof.
a. Provide gasket on ring.

B. Adjust hinges on hatch cover to seat flat and level with ring.

C. Touch up coatings per Division 09 Section “Steel Coatings.”

3.7 OVERFLOW PIPE SCREEN REPLACEMENT (Manchester & North Campus Tanks)

A. Remove existing internal screen from base of overflow pipe.

B. Replace screen with 24 mesh screen using existing fasteners.

C. Clean surfaces prior to installation.

D. Install in a vertical position.

3.8 FILL PIPE INSULATION (North Campus Tank)

A. Remove existing insulation from entire length of fill pipe.

B. Properly dispose of all removed materials.

C. Clean and paint fill pipe in accordance with Division 09 Section “Painting.”

D. Apply insulation after coating has been allowed sufficient cure.

E. Install aluminum frost jacket with banded and pop riveted seams.

F. Install insulation and frost jacket per manufacture recommendations.
1. Install beginning at base working up to entrance into tank.
a. Jacketing shall shed water.
b. Include vertical sections within pit if applicable.

2. Use properly sized insulation for:
   a. Pipes.
   b. Couplings.
   c. Flanges.
   d. Expansion joints.
3. Tape all horizontal and vertical seams.
4. Custom fit areas including:
   a. Flanges
   b. Expansion joints
   c. Dresser couplings
   d. Elbows
   e. Angled pipe sections
   f. Portals through balconies

END OF SECTION 05 60 10

SECTION 07 10 15 – WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of waterproofing over concrete areas and the major items listed below:
   1. Self adhered sheet waterproofing.

B. Refer to Paragraph 3.1 of this Section regarding verification of compatibility with existing waterproofing.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standard Specifications, Methods, Test Methods and Classifications.
      a. C272 - Water Absorption of Core Materials for Structural Sandwich Construction.
      b. C719 - Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
      c. C794 - Adhesion-in-Peel of Elastomeric Joint Sealants.
      d. C920 - Elastomeric Joint Sealants.
      e. C1193 - Guide for Use of Joint Sealants.
      f. D412 - Test Methods for Rubber Properties in Tension.
      g. D570 - Test Method for Water Absorption of Plastics.
      h. D1621 - Compression Properties of Rigid Cellular Plastics.
      i. D1970 - Self Adhered Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection and Waterproofing.
      j. D4258 - Practice of Cleaning Concrete for Coatings.
      k. D4259 - Practice for Abrading Concrete.
      l. D4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.
      m. D5385 - Hydrostatic Pressure Resistance of Waterproofing Membranes.
      n. D5957 - Guide for Flood Testing Horizontal Waterproofing Installations.
      o. D6135 - Application of Self-Adhering Modified Bituminous Waterproofing.
      p. E96 - Test Methods for Water Vapor Transmission of Materials.
      q. E154 - Methods of Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces.
      r. G21 - Recommended Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.4 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.
   3. Authorized by Manufacturer to install Manufacturer’s products.

B. Source Limitation: Obtain waterproofing materials through one source from a single Manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in accordance with Manufacturer's directions in a manner which will prevent deterioration or damage, contamination with foreign matter, and damage by weather or elements. Store rolls according to Manufacturer's written instructions. Protect stored material from direct sunlight.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no addition cost to Owner.

1.6 WARRANTY

A. Upon completion of this portion of the work, and as a condition of acceptance, deliver a warranty signed by Contractor, and officer of the applicator firm, and the materials Supplier, in which the signatories state and affirm:
   1. The work of this Section was completed in accordance with the requirements of the Contract Documents.
   2. Should water penetrate through the work of this Section within 5 years following date of Substantial Completion of the Work, and promptly upon receipt of notice from Owner to that effect, the materials Supplier will provide such additional waterproofing and protection board materials as are required, and Contractor and applicator will provide such equipment, labor, and other materials as are required, to properly repair the area through which water penetrated.
   3. Should the water penetration be due to faulty original workmanship or materials of this Section, the equipment, labor, and materials will be provided at no additional cost to Owner.
   4. Should the water penetration not be due to faulty original workmanship or materials of this Section, the equipment, labor, and materials provided under this Article will be paid for promptly by Owner at the current rates of Contractor, applicator, and materials Supplier.

PART 2 - PRODUCTS

2.1 SELF ADHERED SHEET WATERPROOFING

A. Membrane shall be one of the following products or approved equivalent:
   1. Bituthene by W.R. Grace and Company, Cambridge, MA 02140.
   2. Mel-Rol by W.R. Meadows, Inc., Hampshire, IL 60140.
   3. CCW-701 by Carlisle Coatings and Waterproofing Div., Sapulpa, OK 74066.
   4. Duramem 700 SM by Pecora Corporation, Harleysville, PA 19438.

B. Membrane:
   1. 60-mil thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to 4-mil thick polyethylene film release liner on adhesive side.
   2. Physical Properties:
      a. Tensile Strength: 250 psi minimum in accordance with ASTM D412, Die C, modified.
      b. Elongation: 300% minimum in accordance with ASTM D412, Die C, modified.
      c. Flexibility: Pass at minus 20 deg F in accordance with ASTM D1970.
      d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement as tested by ASTM C836.
      e. Puncture Resistance: 40 lbf minimum in accordance with ASTM E154.
      f. Hydrostatic Head Resistance: 150 feet minimum in accordance with ASTM D5385.
      g. Water Absorption: 0.15% weight gain maximum after 48-hr immersion at 70 deg F in accordance with ASTM D570.
      h. Vapor Permeance: 0.05 perms in accordance with ASTM E96, Water Method.

C. Auxiliary Materials:
   1. Primer: Liquid primer recommended for substrate by sheet waterproofing Manufacturer.
   2. Surface Conditioner: Liquid waterborne conditioner recommended for substrate by sheet waterproofing Manufacturer.
   3. Concealed Strip Flashing: Self adhering, rubberized asphalt composite sheet of same material and thickness as waterproofing membrane.
   4. Substrate Patching Membrane: Low viscosity, 2-component, asphalt modified coating.

5. Mastic, Adhesives, and Tape: Manufacturer's standard products compatible with membrane used.
6. Metal Termination Bars: Galvanized steel or aluminum bars 1-inch wide by 1/8-inch thick pre-drilled at 9-inch centers.
7. Protection Course:
    a. 1/4-inch thick semirigid sheets of fiberglass or mineral reinforced asphaltic core, pressure laminated between two asphalt saturated fibrous liners.

D. Provide Manufacturer's standard products as required for environmental conditions that occur at the time of installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements and other conditions affecting performance:
    1. Verify that concrete has cured and aged minimum of 7 days.
    2. Verify that substrate is visibly dry and free of moisture: Test for capillary moisture by plastic sheet method according to ASTM D4263.
    3. Verify presence of existing waterproofing.
        a. If existing waterproofing is present, verify compatibility with proposed waterproofing.
        b. If existing and proposed waterproofing are not compatible, inform Engineer and provide substitute product of equal performance to that specified that is compatible with the existing at no extra cost to the Owner.

B. Environmental Limitations:
    1. Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing Manufacturer.
    2. Do not apply waterproofing in snow, rain, fog, or mist.

C. Maintain adequate ventilation during preparation and application of waterproofing materials.

3.2 PREPARATION

A. Substrate Preparation:
    1. Clean and prepare substrate according to Manufacturer's written instructions:
    2. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Protection: Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.

C. Cleaning:
    1. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
    2. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents.
    3. Remove remaining loose material and clean surfaces according to ASTM D4258.

D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

E. Joints and Cracks:
    1. Prepare, fill, prime, and treat joints and cracks in substrate.
    2. Remove dust and dirt from joints and cracks according to ASTM D4258.
    3. Install sheet strips and center over non-moving joints and cracks exceeding 1/16-inch in width.
    4. Bridge and cover expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips:
        a. Invert and loosely lay first sheet strip over center of joint.
        b. Firmly adhere second sheet strip to first and overlap to substrate.

F. Corners:
   1. Prepare, prime, and treat inside and outside corners according to ASTM D6135.
   2. Install membrane strips centered over vertical inside corners.
   3. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
      a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
      b. At deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing, and at drains and protrusions according to ASTM D6135.

3.3 INSTALLATION OF SELF ADHERED SHEET WATERPROOFING

A. Install self adhered sheets according to Manufacturer's written instructions and recommendations in ASTM D6135.

B. Primers:
   1. Apply primer to walls or deck at required rate and allow to dry.
   2. Limit priming to areas that will be covered by sheet waterproofing in same day.
   3. Re-prime areas exposed for more than 24 hours.

C. Membrane Application:
   1. Apply and firmly adhere sheets over area to receive waterproofing from low point up to high point to ensure that side laps shed water.
   2. Accurately align sheets and maintain uniform 2-1/2-inch minimum lap widths and end laps.
   3. Overlap and seal seams and stagger end laps to ensure watertight installation.
   4. Apply continuous sheets over sheet strips bridging substrate cracks and construction joints.
   5. Seal exposed edges of sheets with mastic or sealant at terminations not concealed by metal counter-flashing or ending in reglets.
   6. If waterproofing ties into other waterproofing, install sheets and auxiliary materials so that systems are fully watertight.

D. Repairs:
   1. Repair tears, voids, and lapped seams in waterproofing not complying with these Specifications.
   2. Slit and flatten fishmouths and blisters, and cover with patches extending 6 inches beyond repaired areas in all directions.
   3. Correct deficiencies in or remove waterproofing that does not meet requirements, repair substrates, reapply waterproofing, and repair sheet flashing.

E. Install protection course with butted joints over waterproofing before starting subsequent operations.

3.4 PROTECTING AND CLEANING

A. Cure waterproofing according to Manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.

B. Do not permit foot or vehicular traffic on unprotected waterproofing.

C. Protect waterproofing from damage and wear during remainder of construction.

D. Prior to acceptance of the work of this Section, thoroughly clean all related areas in accordance with Division 01 Section "Cleaning and Waste Management."

END OF SECTION 07 10 15

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of joint sealant systems.
   1. Non-sag gunnable joint sealants.
   2. Joint backings and accessories.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM:
      a. C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.
      b. C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.
      c. C920 - Standard Specification for Elastomeric Joint Sealants.
      d. C1193 - Standard Guide for Use of Joint Sealants.
      e. C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
      f. C1311 - Standard Specification for Solvent Release Sealants.
      g. C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
      h. C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
      i. D2240 - Standard Test Method for Rubber Property--Durometer Hardness.
      j. D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.
      k. D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
      l. D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
   2. SCAQMD 1168 - Adhesive and Sealant Applications.
   3. SWRI (VAL) - SWR Institute Validated Products Directory Current Edition.

1.4 SUBMITTALS

A. Product Data for Sealants: Submit Manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Substrates for which laboratory adhesion and/or compatibility testing is required.
   7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 3 years' experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least 3 years of experience.

1.6 WARRANTY

A. Correct defective work within a 5-year period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 NON-SAG JOINT SEALANTS

A. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 45, Shore A, when tested in accordance with ASTM C661.
   3. Color: Gray.
   4. Service Temperature Range: Minus 20 to 120 degrees F.
   5. Manufacturers:
      a. Pecora Corporation.
      b. Sika Corporation.
      c. Tremco Commercial Sealants & Waterproofing.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with Manufacturer's instructions.

C. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

A. Perform work in accordance with sealant Manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside Manufacturer's recommended temperature range or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Non-sag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.4 FIELD QUALITY CONTROL

A. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION 07 92 00

SECTION 08 10 03 – ACCESS HATCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of access hatches and related accessories.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the pertinent provisions of the following:
   1. AASHTO:
      a. Standard Specifications for Highway Bridges, 16th Edition.
   2. ASTM Standards:
      a. A666 - Annealed and Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
      b. B209 - Aluminum and Aluminum Alloy Sheet and Plate.
      c. B221 - Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
      d. B632 - Aluminum Alloy Rolled Tread Plate.

1.4 SUBMITTALS

A. Product Data:
   1. Submit Manufacturer’s printed construction product details indicating materials, individual components, profiles, live load capacities and finishes for access hatches.

1.5 QUALITY ASSURANCE

A. Access hatches shall be manufactured by a producer who has been in the business for not less than 5 years.

B. Qualifications:
   1. Fabrication and Installation Personnel:
      a. Trained and experienced in the fabrication and installation of the materials and equipment.
      b. Knowledgeable of the design and the reviewed Shop Drawings.
   2. Source Limitations:
      a. Obtain materials through one source from a single Manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. Bilco Company.
   2. J. L. Industries, Inc.
   3. Karp Associates, Inc.
   4. Milcor Limited Partnership.
   5. Nystrom Building Products Co.
   6. Versa Hatch.

2.2 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B221, alloy 6063-T6.

C. Aluminum Alloy Rolled Tread Plate: ASTM B632, alloy 6061-T6.

D. Fasteners:
   1. Manufacturer's stainless steel.

2.3 ACCESS HATCHES

A. General: Each access hatch shall have:
   1. Adjustable counterbalanced springs.
   2. Heavy-duty fold-open arm that automatically locks door open at 90 degrees.
   3. Release handle with red vinyl grip that allows for one-handed closure.
   4. Recessed lift handle.
   5. Lock: Full welded exterior hasp and staple for Owner's padlock.
   6. Coat aluminum which is to be in contact with concrete with bituminous mastic.

B. Aluminum Flush Mounted Access Hatches:
   1. Mill finished extruded aluminum angle channel frame with 1/4-inch-thick minimum diamond pattern aluminum tread plate in accordance with ASTM B632.
   2. Size: As indicated on the Drawings.
   3. Loading capacity shall support 300 lbf/sq ft live load.
   4. Watertight Door Features:
      a. Type 316 stainless steel hardware throughout.
      b. NPS 1-1/2 drainage coupling integral in extruded channel frame for conducting water to drainage system.
   5. Products:
      a. Bilco Company, Type JAL.
      b. Karp Associates, Inc., Type KFD.
      c. Nystrom Building Products, Inc., Style FHA or FGA (watertight).
      d. Or equal.

C. Reservoir Access Hatches:
   1. Surface mounted style access hatch with overlapping, gasketed lid with turned down edges.
   2. Mill finished aluminum angle frame with internal mounting flange.
   3. Mill finished diamond pattern aluminum tread plate cover.
   4. Size: As required to place mounting holes a minimum of 3 inches from edge of concrete.
   5. Loading Capacity: 100 lbf/square foot minimum live load.
   6. Gasket: Extruded EPDM rubber gasket permanently adhered to cover.
   7. Hinges: Heavy-duty, stainless steel pintle hinges with type 316 stainless steel hinge pins.
   8. Latch: Type 316 stainless steel slam lock with fixed interior handle and removable exterior turn/lift handle. Latch release protected by a flush, gasketed, removable screw plug.
   9. Lift Assistance: Gas strut lifting mechanism with powder-coat finish. Automatic hold-open arm with grip handle release.
   10. Hinges: Heavy-stainless steel butt hinges with stainless steel pins.
   11. Hardware: Type 316 stainless steel.
   12. Products:
      a. Bilco Company, Type SM.
      b. Or equal.

D. Safety Accessories:
   1. Safety Post:
      a. Type 304 stainless with sand blast finish.
      b. Adjustable mounting hardware to accommodate variation in rung size and spacing.
      c. Telescoping design spring balanced for ease of operation.
      d. Automatically locks in the fully raised position to provide a firm and steady hand hold for safe egress.
      e. Release lever to allow the safety post to be easily lowered to its retracted position.
      f. Bilco LadderUP Safety Post; or equal.
   2. Provide for each hatch, for attachment to new and existing conditions as applicable.

2.4 FABRICATION

A. Provide access hatch assemblies manufactured as integral units ready for installation.

B. Latching Mechanisms:
   1. Furnish sufficient number of latches to hold doors in flush, smooth plane when closed.

PART 3 - EXECUTION

3.1 PREPARATION

A. Advise installers of other work about specific requirements relating to access hatch installation.

3.2 INSTALLATION

A. Install access hatches in conformance with the Manufacturer's recommendations.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent surfaces.

C. In watertight hatches, route piping from drain coupling on frame to exterior of structure.

3.3 ADJUSTING, CLEANING, AND PROTECTING

A. Adjust hatches and hardware after installation for proper operation.

B. Remove and replace hatches and frames that are warped, bowed, or otherwise damaged.

C. Prior to acceptance of the Work of this Section, clean all affected areas in accordance with Division 01 Section “Cleaning and Waste Management.”

D. Protect surface of hatch during construction of remainder of the Project.

END OF SECTION 08 10 03

SECTION 09 91 00 – PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and application of coating products, such as paints, stains and sealers, and labeling products.
   1. Surfaces to be painted or finished include, but are not necessarily limited to, the following interior and exterior surfaces for items furnished or installed under this Work, except as otherwise indicated on the Drawings or herein specified, and existing surfaces specifically identified herein or on the Drawings:
      a. Galvanized steel.
      b. Exposed pipe, valves and fittings including wall and floor sleeves (if pipe is insulated, insulation shall be painted).
      c. Exposed pipe, valves, fittings, and pipe supports including surfaces between pipes and supports.
      d. All other surfaces not specifically excluded in the following paragraph. A completely finished project is required, regardless of whether every individual item is specified herein or indicated on the Drawings to be painted.
   2. Surfaces not to be painted or finished include the following unless otherwise indicated on the Drawings:
      a. Immersed cast-in-place and precast concrete.
      b. Interior, below grade walls and ceilings.
      c. Glass.
      d. Manufacturer's name and identification plates.
      e. Concealed ducts, pipes and conduits.
      f. Galvanized, aluminum and fiberglass grating.
      g. Prefinished electrical and control panels with factory applied final finish.
      h. Aluminum (unless specifically indicated to be painted).
      i. Door and window hardware.
      j. Stainless steel (unless specifically indicated to be painted).
      k. Prefinished wall, ceiling and floor coverings.
      l. Items with factory applied final finish, such as cabinets, anodized door and window frames, and the like, but excluding machinery and equipment.
      m. Brick.
      n. Structural glazed facing tile.
      o. Items indicated on the Drawings as not to be painted.
      p. PVC insulation jackets for pipe.

1.3 REFERENCES

A. Except as herein specified or as indicated on Drawings, the work of this Section shall comply with the pertinent provisions of the following:
   1. ASME/ANSI: A13.1 - Scheme for the Identification of Piping Systems.
   2. ASTM:
      a. A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
      b. D16 - Terminology for Paint, Related Coatings, Materials, and Applications.
      c. D520 - Zinc Dust Pigment.
      d. D523 - Test Method for Specular Gloss.
      e. D7234 - Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
      f. F1869 - Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride.
   3. Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers:
      a. Ten States Standards 2.14 - Recommended Standards for Water Works.
      b. Ten States Standards 54.5 - Recommended Standards for Wastewater Facilities.

4. International Concrete Repair Institute: Guideline No. 03732 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
5. Michigan Administrative Code: R 325.51992 Part 603 - Lead Exposure in Construction.
6. National Association of Pipe Fabricators (NAPF):
   a. NAPF 500-03-01 - Solvent Cleaning for Ductile Iron.
   b. NAPF 500-03-02 - Hand Tool Cleaning for Ductile Iron.
   c. NAPF 500-03-03 - Power Tool Cleaning for Ductile Iron.
   d. NAPF 500-03-04 - Abrasive Blast Cleaning for Ductile Iron Pipe.
   e. NAPF 500-03-05 - Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
7. United States Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1926.62.

1.4 DEFINITIONS

A. Terms:
   1. Coating: Paint, stain, sealer or other product specified.
   2. Environment:
      a. Severe: Highly corrosive industrial atmospheres with sustained exposure to high humidity and condensation, frequent cleaning using strong chemicals, heavy concentrations of strong chemical fumes, and frequent splashing and spilling of harsh chemical products.
      b. Moderate: Corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, regular cleaning with strong chemicals, and occasional splashing and spilling of chemical products.
      c. Mild: Industrial atmospheres with normal exposure to moderate humidity and condensation, occasional mold and mildew development, infrequent cleaning with strong chemicals, low levels of mild chemical fumes, occasional splashing and spilling of chemical products, and normal outdoor weathering.
   3. Exposure:
      a. Environmental conditions to which different surfaces may be exposed as follows:
         1) Concealed: Surfaces within the confines of a building or other enclosure not constantly exposed to weather, trapped moisture, high heat or other deteriorating conditions, and normally concealed from view.
         2) Immersed:
            a) Surfaces below a liquid surface or exposed to spray.
            b) Surfaces exposed to spray include areas to 8 inches above maximum liquid surface in quiescent structures and to 18 inches above maximum liquid surface in mixed or agitated structures.
            c) Immersed surfaces also include the interior surfaces of the floors, walls, and tops of fully or partially enclosed liquid containing structures, regardless of the liquid level.
         3) Interior: Surfaces within the confines of a building or other enclosure not immersed or constantly exposed to weather, trapped moisture, high heat or other deteriorating conditions, and exposed to view.
         4) Exterior:
            a) Above Grade: Surfaces above finished grade and not included in 1), 2), or 3) above.
            b) Below Grade: Surfaces below finished grade and not included in 1), 2), or 3) above.
   4. Gloss Range (as determined by ASTM D523):
      a. High Gloss: A high sheen finish of more than 70 when measured at a 60 degree meter.
      b. Semi Gloss: A medium sheen finish of 35 - 70 when measured at a 60 degree meter.
      c. Satin: A low-to-medium sheen finish of 15 - 35 when measured at a 60 degree meter.
      d. Eggshell: A low sheen finish of 20 - 35 when measured at a 60 degree meter.
      e. Flat: A lusterless or matte finish of less than 5 when measured at an 60 degree meter.

1.5 SUBMITTALS

A. Manufacturer's Literature: Specification data sheets and color charts for materials proposed for use on the Work. Provide Safety Data Sheets (SDS) as requested by Engineer.

B. Schedules:
   1. Submit a finish schedule indicating rooms and other structures and systems to be coated, items or areas to be coated, the proposed coating system, including surface preparation, primer, intermediate/finish coats, application methods and color charts.

2. Schedule shall be submitted as a complete package.
3. No coatings may be applied until Engineer has made a complete review of the entire submittal.

C. Manufacturer's Certificates: Submit signed affidavit from coatings Manufacturer that submitted coatings are of same or better quality than those specified, and Manufacturer's approval of applicator.

D. Applicator's Experience: Submit written verification of experience required herein.

E. Product and Maintenance Schedules:
1. At or before the completion of the Work, submit complete lists, in a finish schedule, of the actual products used. Include item covered, coating Manufacturer's name, type of coating and color.
2. Provide pipe coding schedules listing pipe name, coating Manufacturer's name, type of coating and color.
3. Provide maintenance manuals detailing the proper procedures and materials to be used for maintenance and repainting of the various coatings.

1.6 QUALITY ASSURANCE

A. General:
1. Acceptability of materials and performance shall be determined by Engineer.
2. Testing or certifications may be required to aid Engineer's determination.
   a. Expense of testing and certifications when required and, unless noted otherwise in the Contract Documents, shall be borne by Contractor.
   b. If destructive testing is required, Contractor shall repair damaged area. Expense of repair shall be borne by Contractor.
   c. If initial testing results are unsatisfactory or yield failing results, additional testing will be required. Cost of additional testing shall be borne by Contractor.
3. Coating Reviews:
   a. Request, in writing, a review of each coat by Engineer of first finished surface of each type for color, texture and workmanship.
   b. First accepted surface of each type and color shall be visibly labeled by Engineer with removable label as Project standard for that type and color of item.
   c. Labels shall remain in place until painting is finished and accepted.
   d. For spray application, paint a surface of 100 square feet as a Project standard.
4. Work may be inspected as to proper surface preparation, pretreatment, priming, dry film thickness, curing, color, and workmanship.
5. Applicable standards, test methods, and inspection equipment includes, but is not necessarily limited to the following:
   a. SSPC-VIS-1 photographic blast cleaning standards (latest revision).
   b. Inspector's wet film and dry film thickness gages.
   c. Zorelco 369/PHD pin hole detector.
   d. Mark II Tooke Gage.

B. Coating Subcontractors:
1. Applicators shall have experience with the coating systems specified.
2. Experience shall be substantiated by previous project experience, certifications, seminar attendance, Manufacturer validation, or similar means.

C. Pre-Application Meeting:
1. Convene a pre-application meeting before the start of work and prior to ordering materials.
2. Require attendance of parties directly affecting work of this Section, including Engineer, applicator and coating Manufacturer's technical representative.
3. Review the following as a minimum:
   a. Access and safety requirements.
   b. Heating, ventilation and humidity control measures to be utilized.
   c. How application information will be monitored and recorded, including responsible personnel, monitoring equipment, forms, and timely reporting of information recorded.
   d. Protection of surfaces not scheduled to be coated.
   e. Schedule of work.
   f. Surface preparation.
   g. Coating application.

h. Daily log to be used.
i. Repairs anticipated.
j. Applicator's field quality control.
k. Cleaning procedures.
l. Testing procedures.
m. Protection of coating systems.
n. Coordination with Owner's activities.

D. Manufacturer's Services:
1. Arrange for Manufacturer's technical representative to provide the services indicated below.
2. Site Visits by the Manufacturer's Technical Representative:
a. The pre-application meeting.
b. A visit to observe surface preparation and review application techniques of components of the system.
c. A visit to review the completed installation.
3. Generally provide assurance and guidance for the entire coating system installation.
4. Written documentation required from the coating system Manufacturer:
a. A letter of acknowledgement that the coating system materials are specified to be used in a location and for a purpose that meets with the approval of the coating system Manufacturer and the intent of the Contract Documents. The signed letter shall certify that the Manufacturer's technical representative:
1) Is familiar with the Project, has attended meetings and is aware of the Project conditions and aware of associated products (i.e. filler resurfacers, primers, coatings and other products proposed for the Project).
2) Agrees with the intended application of their products as specified.
3) Agrees with the surface preparation specified, as completed.
4) Agrees with the specifications. If necessary, submit revisions to specifications.
5) Agrees that their products are compatible with associated products (i.e. concrete repair materials, existing coating systems, and other products proposed for the Project).
6) Agrees with the type and quantity of testing to be performed, to ensure their product is adequately installed.

E. Installation Subcontractor's Supervising Site Representative:
1. On Site during work being performed.
2. Knowledgeable of all aspects of the work.
3. Review each day's agenda with crew, and with Contractor's and Engineer's Site representatives.
4. If a portion of the work becomes unclear as to the most appropriate direction, work shall stop until a consensus is reached by all parties, including the Engineer's representative and the Manufacturer's technical representative, as required.

F. Applicator's Project Record:
1. Applicator shall maintain a record for each day work is performed, and shall include a record of application process information. At a minimum, applicator's record shall include:
a. Material Manufacturer's batch numbers.
b. Surfaces to which material is applied.
c. Time of application.
d. Ambient temperature.
e. Substrate temperature.
f. Substrate moisture.
g. Relative humidity.
h. Dew point temperature.
i. Use of heating, dehumidification and ventilation equipment.
j. Unusual or important conditions, features, or events that occur before, during or after work is performed that day. Such information shall be referred to on previous or subsequent daily reports, when appropriate.
2. Submit for Project record.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original sealed containers of the Manufacturer with labels legible and intact. Include the following on labels on each container:
   1. Manufacturer's name.
   2. Type of coating.
   3. Manufacturer's stock number.
   4. Manufacturer's batch identification.
   5. Color name and number.
   6. Instructions for mixing and reducing, where applicable.
   7. Percent total solids by volume.
   8. Identification of toxic substances and special instructions.
   9. VOC content.

B. Storage:
   1. Store materials in tightly covered containers at a minimum ambient temperature of 45 degrees F.
   2. Store materials in a well ventilated area and in such a manner as to comply with safety requirements including applicable federal, state, and local rules and requirements.
   3. Storage shall also be in accordance with instructions of the paint Manufacturer and requirements of insurance underwriters.
   4. Maintain storage containers in a clean condition, free from foreign materials and residue:
      a. Protect from freezing.
      b. Keep storage area neat and orderly.
      c. Remove oily rags and waste daily and dispose of legally.

C. Handle volatile products carefully and use caution so as not to puncture containers. Keep open flame away from areas while handling containers and be aware of material flash points.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Waterborne Paints:
      a. Apply only when temperature of surface to be painted and surrounding air are between 50 and 90 degrees F.
      b. Maintain temperature range throughout the minimum cure time recommended by the Manufacturer.
   2. Solvent-Thinned Paints:
      a. Apply only when temperature of surface to be painted and surrounding air are between 45 and 95 degrees F.
      b. Maintain temperature range throughout the minimum cure time recommended by the Manufacturer.
   3. Inclement Weather:
      a. Do not apply paint:
         1) In snow, rain, fog, or mist.
         2) When relative humidity exceeds 85%.
         3) When steel temperature is less than 5 degrees F above the dew point.
         4) To damp or wet surfaces.
      b. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the Manufacturer during application and drying periods. Refer to Article 1.7 for further restrictions.

B. Existing Painted Surfaces:
   1. When painting is specified over existing painted surfaces and existing coating types are not known, analyze samples of existing coatings using a laboratory approved by Engineer to determine generic type of coating present and the presence of lead.
   2. Submit written report from the lab to Engineer before coating is applied.
   3. Required modifications to painting schedule caused by existing paint shall not be justification for extra payment.

4. Existing Coat Bonding Failure:
    a. Remove existing coating by abrasive blasting or other means, obtaining surface cleanliness and profile required for coating specified without damaging the substrate to the point of affecting its appearance.
    b. Paint as new surface.
    c. Unforeseen failure conditions may be justification for extra payment.

C. Epoxy Coatings:
1. Do not expose epoxies during application and cure to sunlight and heaters that emit carbon dioxide and carbon monoxide.
2. Use caution when applying and curing epoxy coatings to ensure that surrounding areas are not occupied and that adequate ventilation and fresh air are present.

D. Contractor shall demonstrate acceptability of environmental conditions as required by Engineer.

1.9 LEAD PAINT REMOVAL

A. Comply with applicable rules and regulations for lead based paint removal.

B. Personnel assigned to perform demolition activities in areas containing lead based paint shall be properly trained as outlined in 29 CFR 1926.62 (OSHA Lead Standard). In addition, task specific exposure monitoring shall be conducted to establish either a positive or negative initial determination.

C. Remove and remediate existing lead paint as required to comply with codes and regulations while performing the requirements of the Work. Either remove lead paint completely or partially as required to achieve this.

D. Notify Engineer when lead paint removal is complete.

E. Dispose of lead paint in a manner that complies with laws and regulations.

1.10 EXTRA MATERIALS

A. Leave with Owner at least 1 gallon of each type and color of paint used for finish coats and 1 gallon of each type of thinner required.

B. Containers shall be tightly sealed and clearly labeled.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Coatings:
    a. Tnemec.
    b. Carboline.
    c. ICI/DeVoe.
    d. Sherwin Williams.

B. Single Manufacturer:
1. Materials selected for coating systems for each type of surface shall be the product of a single Manufacturer.
2. Provide primers and undercoats produced by the same Manufacturer as the finish coats.

2.2 MATERIALS

A. Material Types:
1. NSF Certification:
    a. Generally, coating systems in contact with treated potable water require NSF certification.

b. NSF certified coating systems have been included in the painting schedule, where the intended use requires NSF certification.
c. Proposed substitutions shall also carry NSF certification for specific applications.
d. Verify that coating systems utilized carry NSF certification, where such certification is required.

2. Paint, primer and related materials are included in the painting schedule in this Section.
3. Paint used for repair of galvanizing shall have minimum 95% zinc dust in accordance with ASTM D520.

B. Colors: Colors of finish coats shall be as selected by Engineer.

C. Blast Abrasives:
1. Level of ionic contaminants shall be in accordance with SSPC-AB 1.
2. Products and Manufacturers:
a. Magnum Blast by Dust Net, Wedron, Illinois.
b. Black Magnum by Dust Net, Wedron, Illinois.
c. Black Beauty by Reed Minerals, Highland, Indiana.

D. VOC Compliance:
1. Individual coatings and coating systems shall have VOC levels at or below the EPA recommendations identified in 40 CFR Part 59.
2. VOC content shall be tested in accordance with EPA Method 24.

2.3 MIXES

A. Mixing:
1. Deliver paints to the Site ready-mixed, when possible.
2. Mix two-component paints at the Site and observe pot life as recommended by Manufacturer.
3. Proceed with mixing until paint becomes smooth, homogeneous, and free of surface swirls or pigment lumps.
4. When mixing multi-component paints, remix each component individually, then blend the components, as recommended by the Manufacturer, until the mixture is completely uniform in color.

B. Thinning:
1. No thinning will be permitted unless absolutely necessary.
2. Paint shall be spray-applied in as-received condition to demonstrate necessity for thinning.
3. Use only thinners as recommended by paint Manufacturer for specific use.
4. Amount of thinner used shall be reported to Engineer.
5. Measure viscosity to ensure proper thinning ratios have been used.

C. Tinting:
1. Onsite tinting will be permitted only when accepted in writing by Engineer.
2. Use only tinting colors recommended by the Manufacturer for the specific type of coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection:
1. Prior to the commencement of surface preparation or other coating activities, thoroughly inspect the surfaces to determine if the Work is ready to be prepared and painted.
2. Report in writing to Engineer conditions that may potentially affect proper application.
3. Do not commence surface preparation or other coating activities until such defects have been corrected.

B. Correction of Defects:
1. Correct defects and deficiencies in surfaces which may adversely affect work of this Section.
2. Apply filler resurfacers, patching materials and the like that are required to provide the surface recommended by the coating Manufacturer.
3. Start of painting will be construed as the applicator’s acceptance of surfaces and conditions within a particular area.

3.2 TEMPORARY HEATING, VENTILATION AND HUMIDITY CONTROL REQUIREMENTS

A. General:
1. Ventilation is mandatory.
2. Provide ventilation that exhausts fumes and odors to the exterior at a location where existing HVAC systems will not pick up these fumes and odors.
3. Provide negative air pressure to those spaces receiving coatings without reducing air temperatures in those spaces which may impede the curing process of those coating systems.
4. Ventilation is required during surface preparation, application of coating systems, and the curing period for those systems.
5. Provide additional equipment and fuel as required to condition the space for surface preparation, application of products, and curing of those products, in accordance with Manufacturer's requirements. This equipment may include, but is not limited to, heaters, dehumidifiers and fans for intake and exhaust air.

B. Enclosures:
1. Provide temporary enclosures as required to isolate dust, fumes and odors from areas in use, to control temperature and humidity, and to protect surface to be coated from the weather.
2. The enclosure shall be of such quality as to maintain optimal conditions for the work of this Section.
3. The enclosure shall remain until the work is sufficiently cured.

3.3 PREPARATION

A. General:
1. Prepare surfaces in accordance with this Article, the paint Manufacturer's recommendations and as specified in the painting schedule of this Section.
2. Cleanliness of Abrasive Blast-Cleaned Steel:
   a. Determined by Engineer using Steel Structures Painting Council Manual SSPC-VIS-1.
   b. Small steel panels which have been abrasive blast-cleaned and approved for a specific cleanliness may be used for comparative purposes to facilitate inspection and approval.
   c. Securely wrap these panels in clear plastic, seal to protect them from deterioration and mark with appropriate SSPC-SP6 cleaning specification.
3. Cleanliness of Compressed Airs:
   a. Do not use contaminated air for blast cleaning.
   b. Periodically check compressed air used for blasting to verify that it is clean, dry and oil-free by directing its flow toward a sheet of clean white paper.
4. Place oil and water separators in the air line as close as possible to blast-cleaning equipment. Make measurements of surface profile of abrasive blast-cleaned steel with a Keane-Tator Surface Profile Comparator or Testex Press-O-Film and Micrometer.
5. Abrasive Media:
   a. Select abrasive media to provide the type of profile required by the Manufacturer of the coating product.
   b. Abrasive media shall contain less than 5% free silica sand.
6. Protective Covers:
   a. Protect motors, bearings, chain drives, and other moving parts by wrapping with plastic and sealing with tape.
   b. Maintain protective covers in dust tight condition.
7. Correct steel and fabrication defects revealed by surface preparation, such as weld imperfections, delamination, scabs, and slivers, by appropriate trade before proceeding further with surface preparation.
8. Clean Up of Blast Cleaned Areas:
   a. Remove dust and blast products from the abrasive blast-cleaned surfaces by high pressure air or vacuum cleaning.
   b. Completely clean up residue from blasting operations within the entire space to be painted prior to applying coatings.
9. Inspect surfaces after surface preparation is complete and prior to application of coatings.
10. Remove hardware, accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface applied protection prior to surface preparation and painting, and then replace items after paint has dried.
11. When acid etching is the approved means of preparing surfaces for coating systems, protect the surrounding areas. Neutralize dispensed solutions and dispose of properly.

B. Moisture Testing of Concrete and Masonry Surfaces:
   1. Securely tape a 12-inch x 12-inch piece of heavy gage plastic film to the surface in various locations.
   2. Carefully seal the film with tape to prevent the escape of moisture and keep in place for a minimum of 16 hours.
   3. If, after this period of time, moisture is present between the plastic and the surface, additional time for the material to dry will be required. Also, it may be appropriate to execute other means of testing for moisture.
   4. Other Means of Testing for Moisture:
      a. ASTM F1869.
      b. Qualifying moisture meters capable of reading 2 to 100% moisture content on a surface.

C. Ferrous Metals:
   1. Non-Immersed Ferrous Metals:
      a. Surface Preparation - Shop:
         1) Remove dirt, oil, grease and other foreign matter in accordance with SSPC-SP1.
         2) Abrasive blast clean surfaces to specification required for coating to be applied.
         3) Perform abrasive blast cleaning only when the relative humidity is no higher than 75% and the surface temperature of the steel is at least 5 degrees F above the dew point.
         4) Coat cleaned surfaces before visible rust forms on the surface. Do not leave cleaned surfaces uncoated for more than 24 hours.
         5) Apply coating as specified under this Section.
      b. Surface Preparation - Field:
         1) Remove dirt, oil, grease and other foreign matter in accordance with SSPC-SP1.
         2) Prepare field welds by grinding to remove sharp edges, undercuts, recesses and pin holes.
         3) Completely remove weld slag and spatter.
         4) Thoroughly clean damages, scratches and abraded areas of shop primers. Thoroughly clean field welds and areas within 4 inches of field welds before painting using surface preparation methods at least as effective as those specified for the structure itself.
         5) Feather out edges to make touch-up patches inconspicuous.
         6) Clean surfaces with solvent.
         7) Contractor may, at Contractor's option, clean and apply one overall coat of primer for each specified shop coat in place of touch-up or spot priming.
         8) Contractor shall meet applicable surface preparation and application specifications.
   2. Immersed Ferrous Metals:
      a. Surface Preparation - Field:
         1) Remove dirt, oil, grease and other foreign matter in accordance with SSPC-SP1.
         2) Prepare field welds by grinding to remove sharp edges, undercuts, recesses, and pin holes.
         3) Completely remove weld slag and spatter.
         4) Abrasive blast clean surfaces to specification required for coating to be applied.
         5) Perform abrasive blast cleaning only when the relative humidity is no higher than 75% and the surface temperature of the steel is at least 5 degrees F above the dew point.
         6) Coat cleaned surfaces before any visible rust forms on the surface.
         7) Do not leave cleaned surfaces uncoated for more than 24 hours.
         8) Apply coating as specified under this Section.

D. Ductile Iron Pipe and Fittings:
   1. Do not follow preparation procedures typically used for other ferrous metals as these may result in damage to the ductile pipe surface and subsequent reduced coating effectiveness and life expectancy.
   2. Perform surface preparation in accordance with NAPF 500-03-01 through 05 and the painting schedule.

E. Nonferrous Metals and Galvanized Steel:
   1. Remove dirt, oil, grease, and other foreign matter in accordance with SSPC-SP1. For Solvent Cleaning, test surface with copper sulfate solution. If galvanizing turns black, then surface is clean and ready for paint application. Otherwise abrade surface or brush blast in accordance with SSPC-SP7.
   2. Remove white rust by hand or power brushing being careful not to damage or remove the galvanizing.
   3. Remove rust in accordance with SSPC-SP2 or SSPC-SP3.
   4. On surfaces potentially exposed to the touch, such as railings, grind runs and drips of galvanizing material smooth and repair using zinc-rich primer.
   5. On galvanized steel, touch-up exposed metal areas using zinc-rich primer.
   6. Repairs and touch up of galvanized coatings shall comply with ASTM A780. Zinc-rich primers shall be compatible with finish coats.

F. Tanks and Equipment: Open doors, hatches, and covers, and remove removable appurtenances and prepare surfaces separately in accordance with this Section.

3.4 APPLICATION

A. General:
1. Take necessary safety precautions in accordance with this Article, SSPC-PA Guide 3, Manufacturer's recommendations, federal, state, and local rules and requirements, and insurance underwriter's guidelines.
2. Apply coatings in accordance with this Article, SSPC-PA1, and the Manufacturer's recommendations.
3. Moisture Content:
   a. Do not apply initial coating until moisture content of surface is within limitations recommended by paint Manufacturer.
   b. Determine moisture content by one of the following methods:
      1) As specified herein.
      2) By use of a moisture meter approved by Engineer.
4. Mil Thickness:
   a. Apply coats in a uniform manner and of the minimum dry film thickness as indicated in the painting schedule.
   b. Maximum mil thickness shall be as recommended by coating Manufacturer.
   c. Where the mil thickness is not indicated in the painting schedule, it shall be as recommended by coating Manufacturer.
5. Sand and dust between each coat to remove defects visible from a distance of 5 feet.
6. Additional Coats:
   a. Apply within recoat recommendation of the Manufacturer based on temperature and humidity variations.
   b. Schedule inspections so as to not interfere with recoat time.
7. Each coat shall be smooth, free of brush marks, streaks, laps or pile-up of paint, and skipped or missed areas.
8. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
9. Spray apply coatings on hollow metal units.
10. Finish door tops, edges, and bottoms the same as exposed surfaces.
11. Except for contact surfaces, surfaces of fabricated assemblies that are inaccessible after erection shall receive field coats of paint before erection.
12. Ensure that concrete cracks and defects have been repaired prior to applying coating, then fill remaining depressions and crevices with paint if practical.
13. Protect wet paint against damage from dust or other detrimental foreign matter as much as is practicable.
14. Remove grills, covers, and access panels of mechanical and electrical systems and tanks from location and paint separately.
15. Paint the interior surface of ducts flat black in the immediate area of supply and exhaust grilles.
16. Omit application of masonry filler on acoustical masonry.
17. Coat concrete and masonry walls prior to mounting equipment.
18. Where equipment, piping, conduit or the like are removed from an existing painted surface, patch and paint the newly exposed surface as required so the newly exposed surface matches surrounding surfaces in coating and appearance.
19. Where epoxy coatings are scheduled over existing paint:
   a. Test existing paint and substrate for lifting or alligatoring.
   b. If existing paint lifts or alligators, remove it down to bare substrate.
20. Where a portion of a surface is to be coated, carry the coating to the nearest break point in the surface plane beyond the portion specified.

B. Valves, Fittings, and Supports:
1. Paint valves and fittings the same base color as the pipe they adjoin.
2. Paint floor stands the same base color as the pipe they adjoin.
3. Wall Brackets and Pipe Hangers:
   a. Paint the same base color as the wall or ceiling they adjoin.
   b. Use gray color if wall or ceiling is not painted.

3.5 PIPE AND EQUIPMENT IDENTIFICATION

A. General:
1. Identify non-buried piping installed as part of the Work in accordance with ASME/ANSI A13.1, this Section, as required in the pipe identification schedule, and as indicated on the Drawings.
2. Painting or banding of concealed piping above suspended ceilings is not required, but labels as specified following are required.
3. Identify pumps, tanks, and equipment.

B. Color Bands:
1. Where color bands are indicated for piping identification, use colored vinyl tape spaced every 6 feet, before and after each valve and where pipe enters and leaves each wall.
2. Band Widths:
   a. Pipe up to and including 2-inch diameter: 3/4-inch wide.
   b. Pipe 2-1/2-inch to 6-inch diameter: 2 inches wide.
   c. Pipe 8-inch to 12-inch diameter: 4 inches wide.
   d. Pipe 14-inch diameter and over: 6 inches wide.

C. Labels and Arrows:
1. Label pipes at intervals not to exceed 20 feet and where pipe enters and leaves each wall, to identify the contents of the pipe as determined by Engineer.
2. Place an arrow adjacent to every pipe label to indicate direction(s) of flow.
3. Use preprinted labels and arrows manufactured by a company which normally manufactures pipe identification systems.
4. Supply pipe labels, arrows, and color bands by a single Manufacturer.
5. Labels and Arrow Heights:
   a. Pipe or Covering Over 3-inch Diameter: 2-1/4 inches.
   b. Pipe or Covering 1-inch to 3-inch Diameter: 1-1/8 inches.
   c. Pipe or Covering Under 1-inch Diameter: 1/2-inch.
6. Materials shall be suitable for the use intended.
7. Label pumps, tanks, and equipment items, including description and tag number, with lettering size coordinated with Engineer depending on equipment size.

3.6 FIELD QUALITY CONTROL

A. Inspection:
1. To facilitate painting and inspection, each coat of paint shall be of a different color or tint.
2. Finished metal surfaces shall be free of skips, voids or pinholes in each coat when tested with a low voltage detector.
3. Do not apply additional coats until previous coat has been inspected and acknowledged in writing by Engineer.
4. Only coats of paint acknowledged in writing will be considered in determining number of coats applied.

B. Final Touch-Up:
1. Surface damage shall be repaired with touch-up paint matching material used for original coating.
2. Repaired areas shall be rubbed out and polished to match surrounding finish.
3. Finish repair shall be of the quality typically found within the auto body industry.

3.7 CLEANING

A. Remove spilled, splashed, or spattered paint from surfaces.

B. Do not mar surface finish of item being cleaned.

C. Prior to acceptance of the work of this Section, thoroughly clean painted surfaces and related areas in accordance with Division 01 Section “Cleaning and Waste Management.”

3.8 PROTECTION

A. General:
1. Adequately protect other surfaces from paint and damage.
2. Repair damage as a result of inadequate or unsuitable protection.

B. Protective Materials: Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

C. Fire Hazards: Place cotton waste, cloths, and materials which may constitute a fire hazard in closed metal containers and remove daily from Site.

D. Electrical Plates and Hardware:
1. Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations.
2. These items are to be carefully stored, cleaned and replaced upon completion of work in each area.
3. Do not use solvent to clean hardware that may remove permanent lacquer finish.

E. Equipment with Factory-Applied Final Finishes:
1. Certain equipment with factory-applied finishes may be accepted by Engineer at Engineer‘s discretion.
2. Protect finishes of equipment with approved factory-applied final finishes from scratches and abrasions by all practical means.
3. Repair surface damage with touch-up paint furnished by equipment Manufacturer by workmen skilled in this type of work.
4. Rub out and polish repaired areas to match surrounding finish.
5. Finish repair shall be of the quality typically found within the auto body industry.
6. If damage to item is severe in the judgment of Engineer, the equipment will be rejected or a new finish coat shall be applied after proper surface preparation at the discretion of Engineer, at no additional cost to Owner.

3.9 PAINTING SCHEDULE

A. All mil thicknesses indicated are dry film thicknesses (DFT).

1. Interior Ferrous Metals – Non-Immersed: Gloss Zinc/Aliphatic Acrylic Polyurethane System:

System Manufacturer	Surface Preparation	First Coat	Second Coat	Third Coat
Tnemec	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): 90-97 Tneme-Zinc 2.5-3.5 Mils	(Field): 69-Hi-Build Epoxoline 4.0-6.0 Mils	(Field): 1074 Endura-Shield II 3.0-5.0 Mils
Carboline	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): Carbozinc 859 2.5-3.5 Mils	(Field): Carboguard 890 4.0-6.0 Mils	(Field): Carbothane 134HB 3.0-5.0 Mils
ICI/DeVoe	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): CATHCOAT 302 H Reinforced Inorganic Zinc (78%) 2.5-3.5 Mils	(Field): BAR-RUST 231 Epoxy Mastic 4.0-6.0 Mils	(Field): DEVTHANE 379 Aliphatic Urethane Gloss 3.0-5.0 Mils
Sherwin Williams	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): Corothane | Galvapac NSF 2.5-3.5 Mils	(Field): Macropoxy 646 FC 4.0-6.0 Mils	(Field): Acrolon 218HS/HS Polyurethane 3.0-5.0 Mils

2. Interior Non-Ferrous and Galvanized Metals – Non-Immersed: Gloss Zinc/Aliphatic Acrylic Polyurethane System:

System Manufacturer	Surface Preparation	First Coat	Second Coat
Tnemec	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field) 69 Hi-Build Epoxoline II 4.0-6.0 Mils	(Field): 1074 Endura-Shield II 2.0-3.0 Mils
Carboline	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): Carboguard 890 4.0-6.0 Mils	(Field): Carbothane 134HB 2.0-3.0 Mils
ICI/DeVoe	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): DEVRAN 205 Universal Epoxy Primer 4.0-6.0 Mils	(Field): DEVTHANE 379 Aliphatic Urethane Gloss 2.0-3.0 Mils
Sherwin Williams	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): Macropoxy 646 FC 4.0-6.0 Mils	(Field): Acrolon 218HS/HS Polyurethane 2.0-3.0 Mils

3. Existing Ferrous Metals in Wet Environment:

System Manufacturer	Surface Preparation	First Coat	Second Coat	Third Coat
Tnemec	(Field): SSPC-SP6 commercial blast cleaning	(Field): Series 1 Omnithane 2.5-3.5 Mils	(Field): 69 Hi-Build Epoxoline II 3.0-5.0 Mils	(Field): 69 Hi-Build Epoxoline II 2.0-3.0 Mils
Carboline	(Field): SSPC-SP6 commercial blast cleaning	(Field): Carbomastic 615 HS 2.5-3.5 Mils	(Field): Carbomastic 615 HS 3.0-5.0 Mils	(Field): Carbothane 134 HB 2.0-3.0 Mils
ICI/DeVoe	(Field): SSPC-SP6 commercial blast cleaning	(Field): CATHCOAT 302 H Reinforced Inorganic Zinc 2.5-3.5 Mils	(Field): BAR-RUST 233H Multi-Purpose Epoxy 3.0-5.0 Mils	(Field): BAR-RUST 233H Multi-Purpose Epoxy 2.0-3.0 Mils
Sherwin Williams	(Field): SSPC-SP6 commercial blast cleaning	(Field): Corothane | Galvapac NSF 2.5-3.5 Mils	(Field): Macropoxy 646 FC 3.0-5.0 Mils	(Field): Macropoxy 646 FC 2.0-3.0 Mils

3.10 PIPE IDENTIFICATION COLOR SCHEDULE

A. Identify exposed pipes with the following colors.
   1. Colors are from the Tnemec Colorbook color card.
   2. Equivalent colors of other Manufacturers indicated in Part 2 of this Section may be used.

B. Where a facility has an existing identification system already in use, coordinate with the system in use.

C. In situations where 2 colors do not have sufficient contrast to easily differentiate between them, paint a 6-inch band of contrasting color at 30-inch intervals.

Water Plant Piping	Color Description	Tnemec Colorbook ID
Raw Water	Olive Green	Meadow 20 GN
Settled/Clarified Water	Aqua	Aqua Sky 10GN
Filtered Water	Light Blue	Fountainbleu GB04
Potable/Finished/High Service Water	Dark Blue	Safety Blue 11SF

Water Plant Piping	Color Description	Tnemec Colorbook ID
Sludge Lines	Dark Brown	Weathered Bark 84BR
Lime Slurry	Light Green	Irish Spring 37GN
Drain Lines, Vent Lines	Gray	Slate Gray 31GR

END OF SECTION 09 91 00

SECTION 09 97 13 – STEEL COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of coating systems for steel storage tanks.
   1. Surfaces to be painted or finished include, but are not necessarily limited to, the following interior and exterior surfaces for items furnished or installed under this Work, except as otherwise indicated on the Drawings or herein specified:
      a. Steel tank.
      b. Outside of steel inlet/outlet pipe.
      c. Overflow pipe.
      d. Steel ladders.
      e. Exposed conduit and appurtenances (except conduit mounted on unpainted surfaces).
      f. Railings.
      g. Steel doors and frames.
      h. Steel pipe sleeves.
      i. Condensate collection system.
      j. Piping.
   2. Surfaces not to be painted:
      a. Concrete column walls.
      b. Stainless steel.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM:
      a. D412 - Test Methods for Rubber Properties in Tension.
      b. D522 - Test Method for Elongation of Attached Organic Coatings with Conical Mandrel Apparatus.
      c. D543 - Test Method for Resistance of Plastics to Chemical Reagents.
      d. D870 - Practice for Testing Water Resistance of Coatings Using Water Immersion.
      e. D2240 - Test Method for Rubber Property-Durometer Hardness.
      f. D2485 - Test Method for Evaluating Coatings for High Temperature Service.
      g. D4060 - Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
      h. E96 - Test Methods for Water Vapor Transmission of Materials.
      i. G8 - Test Method for Cathodic Disbonding of Pipeline Coatings.
      j. G14 - Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test).
   2. NSF Standards: 61 - Drinking Water System Components - Health Effects.
   3. AWWA Standards: D102 - Painting Steel Water Storage Tanks.
   4. Steel Structures Painting Council (SSPC) Standards and Specifications:
      a. Steel Structures Painting Manual.
      b. Pictorial Surface Preparation Standards for Painting Steel Surfaces - VIS-1.
   5. EGLE: Recommendations for Abrasive Blasting of Water Towers and Other Steel Structures.
   6. MDOT:
      a. Standard Specifications for Construction.
      b. Standard Plans.
      c. Special Provision for Protection of Work and Environment During the Blast Cleaning of Structures for Complete Field Coating.

1.4 DEFINITIONS

A. Abbreviations:
   1. V.O.C. - Volatile Organic Compound.

2. Mils - Thousandths of an inch.
3. DFT - Dry Film Thickness.
4. SSPC – Society of Protective Coatings.
5. NACE – National Association of Corrosion Engineers, International.

B. Exposure: Environmental conditions to which different surfaces may be exposed as follows:
   1. Interior: Surfaces within the confines of a tank structure or other enclosure not constantly exposed to water, weather, trapped moisture, high heat or other deteriorating conditions, and exposed to view.
   2. Concealed: Surfaces within the confines of a tank structure or other enclosure not constantly exposed to water, weather, trapped moisture, high heat or other deteriorating conditions, and normally concealed from view.
   3. Immersed:
      a. Surfaces below a water surface or exposed to spray or trapped moisture.
      b. Surfaces exposed to spray include areas to 8 inches above maximum water surface in quiescent tanks and to 18 inches above maximum water surface in mixed or agitated tanks.
      c. Immersed surfaces also include floors, walls, and the bottom side of the roof of an enclosed tank.
   4. Exterior: Surfaces above finished grade and not included above.

1.5 SUBMITTALS

A. Manufacturer's Literature:
   1. Specification data sheets and color charts for materials proposed for use on the Work.
      a. Coatings.
      b. Fillers.
      c. Surfacers.
      d. Thinners.
      e. Abrasives
   2. Signed affidavit from coatings Manufacturer that submitted materials are of same or better quality than those specified.
   3. Maintenance manuals detailing the proper procedures and materials to be used for maintenance and repainting of the various coatings.

1.6 QUALITY ASSURANCE

A. General:
   1. Acceptability of Materials and Performance: Determined by Engineer.
   2. Testing and certifications shall be required in accordance with Division 01 Section “Special Inspections and Tests” to aid Engineer's determination of acceptability.
   3. Repair areas damaged by destructive testing.
   4. Coating Review:
      a. Request, in writing, Engineer’s review of each coat of first finished surface of each coating type for color, texture and workmanship.
      b. First accepted surface of each type and color shall be visibly labeled by Engineer with removable label as Project standard for that type and color of item.
      c. Labels shall remain in place until job is finished.
      d. For spray application, paint a surface of 100 square feet as Project standard.
   5. Work may be inspected as to proper surface preparation, pretreatment, priming, dry film thickness, curing, color and workmanship.
   6. Applicable standards, test methods and inspection equipment includes, but is not necessarily limited to the following:
      a. SSPC-VIS-1 photographic blast cleaning standards.
      b. Inspector's wet film and dry film thickness gages.
      c. Zorelco 369/PHD pin hole detector.
      d. Mark II Tooke Gage.

B. Be responsible for the compatibility of painting materials.

C. Review Meeting: Prior to ordering the materials of this Section, Contractor, Engineer, coating Subcontractor, and coating Manufacturer's representative shall attend a progress meeting and review the work to be performed under this Section.

D. Applicators: Trained and certified by the Manufacturer of the coatings being supplied.

E. Provide field service by coating Manufacturer's representative during equipment set-up and initial application.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original sealed containers of the Manufacturer with labels legible and intact. Include the following on a label on each coating container:
   1. Manufacturer's name.
   2. Type of coating.
   3. Manufacturer's stock number.
   4. Manufacturer's batch identification.
   5. Color.
   6. Instructions for mixing and reducing, where applicable.
   7. Percent total solids by volume.
   8. Identification of toxic substances and special instructions.

B. Storage:
   1. Store only acceptable Project materials on Project Site.
   2. Store material in a suitable location and in accordance with instructions of the coating Manufacturer and requirements of insurance underwriters.
      a. Store materials in an enclosed area where temperature conditions can be controlled.
      b. Provide a temperature recorder (min/max).
   3. Restrict storage area to coating materials and related equipment.

C. Any material deemed unsuitable by the Engineer or their representative shall:
   1. Be marked by the inspector or Contractor’s field superintendent.
      a. Materials shall be marked with fluorescent paint
   2. Or be removed from the Site by the end of the day.
   3. The use of unsuitable materials shall be construed as a failure of the area or areas painted.
      a. These areas shall be removed by abrasive blast cleaning.
         1) If the area cannot be determined, all paint applied from that date forward shall be rejected.
      b. Painting shall be in accordance with these specifications as if completed originally.

1.8 PROTECTION OF NONWORK AREAS

A. Protect all areas not subject to modification during the work. The Contractor shall provide protection for but not limited to:
   1. Level controls.
   2. Electrical panels, conduit, outlets, lighting and junction boxes.
   3. Cathodic protection systems.
   4. Insulation.
   5. Fall prevention equipment.
   6. Antennae, coaxial wire.
   7. Motors, pumps, seals and bearings.
   8. Gaskets.
   9. Screens.
   10. Gauges and level indicators.

B. Mask, tape, tarp or use other appropriate means to protect all surfaces or appurtenances not subject to alteration, including adjacent personal or private property.

C. Make corrections to the satisfaction of the Owner of the damaged property, if damage occurs. If the damage cannot be corrected by cleaning, the Contractor shall incur the costs for replacement of the damaged property.

D. Notify Engineer or Owner for a determination prior to execution of work if a question exists on whether an item requires protection.

1.9 ENVIRONMENTAL CONSTRAINTS

A. Perform all surface preparation and painting during suitable and favorable climatic conditions. Cease all work and take preventative measures for the following:
   1. Unfavorable weather is present that may adversely affect the long-term quality of the work.
   2. If poor or unsuitable weather is forecast. Take such precautions to prevent damage to the work.

B. In no instances, shall painting be allowed:
   1. During periods of rain.
   2. When rain is forecast prior to full coating cure.
   3. During fog.
   4. During snow.
   5. When the relative humidity exceeds 85%.
   6. When the surface temperature is less than 5 degrees above the dew point.
      a. Provide the following equipment and record a daily log:
         1) Sling psychrometer.
         2) Surface temperature gauge.
         3) Psychometric tables.
   7. When wind speed and direction create the potential for property damage and or create unsafe working conditions for painting or abrasive blast cleaning.

1.10 COMPRESSED AIR AFTER COOLERS

A. Abrasive blast cleaning equipment shall incorporate moisture traps and air cooler.

B. Equipment shall be set up on compressed air line prior to entering the blast pot.

C. After cooler to be sized to cool the hot compressed air to within 5 degrees F to 20 degrees F of the ambient air temperature.

D. Equipment shall match the output of the compressor for proper performance.
   1. Shall be Sullivan Palatek, Aircell or equal.

1.11 MIXING AND THINNING

A. Mix all materials in accordance with the Manufacturer’s recommendations.

B. Use a high shear mixer to create homogenous mixture.
   1. Clean mixer daily.
      a. If the mixer is not cleaned, the paint mixed with it shall be deemed defective and shall be rejected.

C. Agitate zinc rich coatings in accordance with Manufacturer’s recommendations.
   1. Any zinc primer applied that was not under constant low speed agitation shall be deemed defective and shall be rejected.

D. Follow Manufacturer’s instructions for thinning only when necessary.
   1. Any coatings applied that uses the incorrect thinner shall be deemed defective and shall be rejected.

E. In no instance shall thinner be added to materials that have thickened due to catalyzation or are near the pot life.
   1. Discontinue use of all materials reaching this condition.

F. Remove from the Site and properly dispose of all spent thinner used for clean-up.

G. Remove any left-over materials from the Site.

H. Provide ground tarping in mixing area.

1.12 APPLICATION

A. Apply coatings in accordance with Manufacturer's recommendations and these specifications, whichever is more stringent.

B. Perform painting in accordance with good painting practices per SSPC-PA1.

C. Prepare surfaces to specified standard prior to any coating application.
   1. Prior to application of primers or any subsequent coats of paint, all surfaces shall be clean and free of:
      a. Dirt.
      b. Dust.
      c. Oil.
      d. Grease.
      e. Moisture.
      f. Stains, etc.

D. Painting shall be prohibited on surfaces that do not achieve Manufacturer’s minimum or exceed the maximum temperature requirements.

E. Apply all exterior coatings by brush and roller only.

F. Apply coatings at the proper rate and wet film thickness to achieve the dry film thickness specified for each coat and for the entire system.

G. Provide and replace rollers, brushes, spray tips, etc. as they become worn, caked, deteriorated or lose their effectiveness.

1.13 REPAIR OF DEFECTS

A. Repair all surface preparation and coating defects daily and in manner that produces a first-class job. The following defects shall be corrected:
   1. Runs, drips and sags.
   2. Entrapped material.
   3. Skips.
   4. Excessive dry film thickness.
   5. Overspray.
   6. Slugs.
   7. Roller nap.
   8. Blemishes.

B. Remove defects completely by sanding, scraping, power tool sanding or abrasive blast cleaning.

C. Feather smooth adjacent coatings by power tool sanding.

D. Grinders with grinding wheel discs are prohibited.

E. Complete repairs in accordance with these specifications and subject to same quality as if completed initially.

1.14 CURE

A. Allow cure in accordance with Manufacturer's recommendations and these specifications, whichever is more stringent.
   1. Allow 24 hours’ minimum cure time for each coat.
   2. Provide 7 days’ minimum cure after application of topcoat on immersion coating systems.
      a. Extend cure periods in accordance with Manufacturer’s recommendations.
   3. Maintain forced ventilation throughout the entire curing phase on immersion surfaces.

B. If temperature, humidity, ventilation or other factors effecting cure vary from normal recommended schedules, adjust cure times in accordance with Manufacturer's recommendations.
   1. Provide heating and dehumidification equipment when cool temperatures or high humidity exist and shall become mandatory during months of October through April inclusive.
      a. In addition, dehumidification units shall be mandatory when any of the following apply:
         1) Average air temperatures, as determined by the Engineer, fall below 55 degrees F.
         2) Acceptable humidity levels cannot be controlled by normal ventilation.
      b. In addition, heating units shall be mandatory when any of the following apply:
         1) Average air temperatures, as determined by Engineer, fall below 45 degrees F.
      c. Use Munters DCD Series or Dryco desiccant dehumidifier through surface preparation and painting.
      d. For heating use Munters or Dryco indirect heating equipment.
      e. Systems shall have remote monitoring system accessible 24/7 to the Inspector or Engineer via internet.
      f. System shall run continuously through surface preparation, painting and cure.
         1) Size units in accordance with Manufacturer’s representative’s recommendations.
      g. Connect using appropriately sized outlet piping or tubing.
         1) Heating and dehumidification shall be performed at the Contractor's expense and shall be considered incidental to painting.

C. Complete cure prior to the Contract date of completion.

D. Fast cure or low temperature materials are subject to the review of Engineer and shall be in accordance with normal submittal procedure.
   1. Provide low temperature or fast cure products when:
      a. Average surface temperatures fall below 60 degrees F.
      b. Low surface temperatures fall below Manufacturer’s lower limit for cure.
      c. The use of normal cure products would extend the completion date past the Contract completion date.

1.15 QUALITY CONTROL AND ASSURANCE

A. Maintain quality assurance programs prior to, during and through full completion of work.

B. Foreman shall have full authority for conducting work for the Contractor, subject to limitations within Contract Documents, and shall maintain quality assurance programs.

C. Foreman shall perform quality control inspections for all aspects of work.

D. Foreman shall make these inspections prior to inspectors scheduled visit.

E. Defects in work shall be corrected and coatings fully cured prior to inspector’s arrival.

1.16 DISINFECTION

A. Contractor:
   1. Disinfect tank in accordance with AWWA Method #3 (C-652), latest revision.
   2. Collect water samples at specified intervals for bacteriological testing in accordance with rules and procedures of State Health Department, EGLE or USEPA, whichever has jurisdiction.
   3. Two consecutive water samples taken 24 hours apart are required for bacteriological analysis.
   4. Pay for all direct and indirect costs for disinfection, sampling and testing including such additional measures required if the samples fail test.

B. Owner:
   1. The Owner will waste the first full tank of water, per the permit requirements, or per the governing agency.
   2. The chlorinated water will be wasted and dechlorinated prior to discharge to any surface water body, sewer or drain.

1.17 APPEARANCE

A. Use appropriate methods and practices when applying coatings to maximize the aesthetic appearance of finish coat. The finish coat shall be:
   1. Uniform in appearance and completely hide the underlying coat.
   2. Applied using such techniques that minimize roller marks and laps.
   3. Applied in long strokes finished in same direction.

B. Correction of defects shall require recoating a larger area (to a seam or change in shape) to maintain a pleasing aesthetic appearance.

C. Remove all dust, debris, overspray, etc. from finish coat by appropriate means.

D. Remove all dust and debris created by surface preparation by power washing prior to finalization.

1.18 VENTILATION

A. Supply industrial grade dust collectors during abrasive blast cleaning, abrasive removal, cleaning.
   1. Dust collection equipment requirements:
      a. Minimum of 40,000 cfm.
      b. Shall be customized to fit securely to tank, prevent leaks and ensure maximum effectiveness. No dust release shall be permitted.
      c. Provide negative air pressure within vessel to prevent dust escaping out vents, hatches, cathodic lift holes or other openings in structure.
      d. Exhaust through dust collector and regularly cleaned (daily) dust filters.

B. Supply ventilation fans during coating application and cure.
   1. Ventilation equipment requirements:
      a. Minimum of 10,000 cfm.
      b. Shall be customized to fit securely to tank, prevent leaks and ensure maximum effectiveness.
      c. Shall be operated and maintained through final cure.

C. The collection systems, but not the ventilation fans, may be discontinued only during cure. Lead removal projects shall require air filtration dust collectors.

1.19 LIGHTING AND ELECTRICAL

A. Provide lighting, in areas where visibility is poor, to ensure safety and increase productivity.

B. All lights and switches shall be explosion proof when working within confined space.

C. Electrical service may not be available at Site.
   1. In such instances furnish temporary electrical service.
   2. All temporary electrical service shall meet local requirements.
   3. Contract with local utility for service installation.
   4. Obtain any required electrical permit.

1.20 WATER SEEPAGE

A. Furnish and install temporary pipe plugs in the event water seepage occurs from inlet or outlet.

B. The plugs shall provide complete water stoppage or shall allow the bypass of water to an appropriate drain.

C. Bypass pipe plugs shall be Cherne Muni-Ball or equivalent.

D. Furnish drain piping.

1.21 DEWATERING

A. Provide dewatering for water remaining within the vessel.

B. Remove and dispose of water and sediments.

C. Owner will dewater down to the top of fill or drainpipe.

1.22 INSPECTION

A. Provide 48-hour notice to Engineer that the inspection interval has been met.
   1. Contractor shall pay additional engineering fees caused by premature or unnecessary inspections.
   2. Prior to notifying Engineer of future inspection, Contractor shall inspect work and correct all defects.

B. Unless otherwise agreed upon and prior to applying additional coat, each coat of paint will be inspected and defects corrected.

C. Inspections may include but are not limited to:
   1. Materials.
   2. Surface preparation.
   3. Dry film thickness measurements.
      a. Film thickness shall be measured from the top peaks of the profile.
      b. Measurements will be adjusted for the gauge error or BMR due to the profile.
   4. Wet film thickness testing.
   5. Holiday testing.
   6. Visual observations of defects.
   7. Cure.

1.23 WARRANTY

A. Furnish 1 year warranty from date of acceptance to repair defects due to workmanship or materials, or both.

B. Furnish an affidavit that the materials furnished and the Work performed comply with AWWA D102 and these specifications.

C. First Anniversary Inspection: Required in accordance with AWWA D102, Section 09.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Single Manufacturer: Materials selected for coating systems for each type of surface shall be the product of a single Manufacturer.

2.2 ABRASIVES

A. Acceptable Manufacturers:
   1. Single Manufacturer: Materials selected for coating systems for each type of surface shall be the product of a single Manufacturer.
   2. Black Beauty (20-40).
   3. Amberblast (AB #3).
   4. DuPont Starblast or Staurolite.

B. Mix abrasive and Blastox for all abrasive cleaning of painted steel.
   1. In accordance with Blastox recommendations.

C. The use of steel grit may be allowed if the recommended surface profiles can be maintained.

2.3 COATINGS GENERAL

A. All components of a coating system must be from the same Manufacturer.

B. Colors of Finish Coats: Selected by Engineer.
1. Provide a slight color variation between each coat applied in a system.

2.4 WET INTERIOR COATING – ROOF (L140) NSF 600 (North Campus Tank Wet Interior Roof Coating, WTP, Liberty & North Campus Reservoir Wet Interior Piping and Appurtenances)

A. Qualified Manufacturers (NSF 61/600 approved).

B. Coating Manufacturer: Tnemec
1. Primer:
a. Series: 94H2O.
b. Color: Green.
c. DFT: 2.5 – 3.5 Mils.
2. Intermediate:
a. Series: L140.
b. Color: White.
c. DFT: 4.0 – 6.0 Mils.
3. Finish:
a. Series: L140.
b. Color: White.
c. DFT: 4.0 – 6.0 Mils.
4. Total DFT: 10.5 – 15.5.

C. Seam Sealer Manufacturer: Sikaflex 1A.

2.5 DRY INTERIOR COATING – FULL (N140) (North Campus Tank Valve Pit Piping and Appurtenances, WTP Valve Vaults, Vault House, River Valve and Effluent Filter Piping and Appurtenances)

A. Coating Manufacturer: Tnemec.
1. Primer:
a. Series: 94H2O.
b. Color: Green.
c. DFT: 2.5 – 3.5 Mils.
2. Intermediate:
a. Series: N140.
b. Color: Tank White.
c. DFT: 4.0 – 6.0 Mils.
3. Stripe:
a. Series: N140.
b. Color: White.
c. DFT: 4.0 – 6.0 Mils.
4. Finish:
a. Series: N140.
b. Color: White.
c. DFT: 4.0 – 6.0 Mils.
5. Total DFT: 10.5 – 15.5.

2.6 EXTERIOR REPAIR COATING – POLYURETHANE (1094) Manchester and North Campus Tanks, including North Campus Reservoir Vent Piping)

A. Coating Manufacturer: Tnemec.
1. Spot Primer:
a. Series N140.
b. Color: Beige.
c. DFT: 3.0 – 5.0 Mils.

2. Spot Finish:
   a. Series: 1094.
   b. DFT: 2.0 – 3.0 Mils.
   c. Total DFT: 5.0 – 8.0.
3. Finish colors selected shall match existing.
4. Two coats of N140 primer for vent piping.

2.7 WET INTERIOR REPAIR COATING – EPOXY (L140) Manchester Tank)

A. Coating Manufacturer: Tnemec.
   1. Spot Primer:
      a. Series: L140.
      b. Color: Beige.
      c. DFT: 4.0 – 6.0 Mils.
   2. Spot Finish:
      a. Series: L140.
      b. Color: White.
      c. DFT: 4.0 – 6.0 Mils.
   3. Total DFT: 8.0 – 12.0.

2.8 ABRASIVE BLASTING CONTROL

A. Conform to requirements of EGLE.

B. The system of control measures listed below which best fits the EGLE requirements shall be the minimum criteria for control.

C. Control Level 1:
   1. Barrier:
      a. Provide tarpaulins or other approved sheet material, which is 95% effective in containing spent material.
      b. Barrier shall have continuously secured seams.
      c. Extend barrier from work area to grade or to a funnel collecting material and directing it to containers.
   2. Barrier Support:
      a. Support system shall provide a safe work enclosure which shall be designed to support workers, spent materials, and hold barriers securely under 40 mph wind load.
      b. Provide a rapid method of dropping enclosure to the ground when wind speed exceeds 40 mph.
   3. Ground Protection:
      a. Provide tarpaulins or other approved sheet material.
      b. Extend protection from edge of tank foundation to a radius of 70 feet from the center of the tank minimum.
   4. Forced Air Ventilation: Provide intake and exhaust fan equipment with a means of filtering exhaust air through a portable truck mounted filtering system or bag house.
   5. Water dampen abrasive with Hold Tight 102 additive.

D. Control Level 2:
   1. Ground Protection:
      a. Provide tarpaulins or other approved sheet material to collect abrasive material fallout.
      b. Extend from the tank base to a radius at least 40 feet beyond the outside perimeter of the tank.
   2. Water dampen abrasive with Hold Tight 102 additive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection:
   1. Inspect the surfaces to determine if the Work is ready to be prepared and painted prior to the commencement of surface preparation or other coating activities.
   2. Report in writing to Engineer, conditions that may potentially affect proper application.

3. Do not commence surface preparation or other coating activities until such defects have been corrected.
4. Ensure that pipe joints have been sealed in accordance with Division 07 Section “Joint Sealants.”
5. Obtain Engineer's review before commencement of surface preparation or other coating activities.
6. Shop preparation and coating application operations shall be inspected.
7. Notify Engineer 1 week in advance of commencement of surface preparation or other coating activities.

B. Correction of Defects:
1. Correct defects and deficiencies in surfaces which may adversely affect work of this Section.
2. Grind smooth points and imperfections along welds and seams.
3. Grind pitted areas to a profile of 2 mils or less.
4. Notify Engineer prior to grinding when pitted areas to be ground are serious enough to reduce the structural integrity of the steel.

3.2 SURFACE PREPARATION

A. General:
1. Prepare surfaces in accordance with this Article, the paint Manufacturer's recommendations and SSPC.
2. Cleanliness of Abrasive Blast-Cleaned Steel:
   a. Determine using Steel Structures Painting Council Manual SSPC-VIS-1.
   b. Small steel panels which have been abrasive blast-cleaned and approved for a specific cleanliness may be used for comparative purposes to facilitate inspection and approval.
   c. Wrap these panels securely in clear plastic, seal to protect them from deterioration and mark with appropriate cleanliness specification, e.g., SSPC-SP6.
3. Cleanliness of Compressed Air:
   a. Periodically check compressed air used for blasting to verify that it is clean, dry and oil-free by directing its flow toward a sheet of clean white paper.
   b. Place oil and water separators in the air line as close as possible to blast-cleaning equipment.
   c. Do not use contaminated air for blast cleaning.
4. Make measurements of surface profile of abrasive blast-cleaned steel with a Keane-Tator Surface Profile Comparator or Testex Press-O-Film and Micrometer.
5. Abrasive Media:
   a. Select abrasive media to provide the type of profile required by the Manufacturer of the coating product.
   b. Abrasive media shall be a recognized low dust abrasive containing less than 3% free silica sand.
6. Protective Covers:
   a. Protect motors, bearings, chain drives and other moving parts by wrapping with plastic and sealing with tape.
   b. Maintain protective covers in dust tight condition.
7. Correct steel and fabrication defects revealed by surface preparation, such as weld imperfections, delamination, scabs, and slivers by appropriate trade before proceeding further with surface preparation.
8. Clean Up of Blast-Cleaned Areas:
   a. Remove dust and blast products from the abrasive blast-cleaned surfaces by high pressure vacuum cleaning.
   b. Completely clean up residue from blasting operations.
9. Monitor wind speed during the use of the abrasive blasting enclosure.
10. Collect and dispose of spent abrasive blasting material.

B. Specific:
1. <u>Wet Interior Roof Surfaces – Spot Blast/Brush Blast (North Campus Tank):</u>
   a. Spot abrasive blast clean all rusted or abraded roof surfaces and appurtenances to a near white grade (SSPC-SP10).
   b. Brush blast clean all painted roof surfaces and appurtenances to:
      1) Remove any loose or poorly adhering paint.
      2) Build a surface profile in remaining paint.
   c. Roof is defined as all surfaces and appurtenances from the center down to 4 feet below the overflow level including that portion of the access tube if applicable.
2. <u>Dry Interior Surfaces – Full Blast (North Campus Tank):</u>
   a. Compressor output shall maintain a minimum pressure of 100 psi as measured by needle gauge at each blast nozzle.
   b. Unless otherwise specified, select the proper abrasive grade and hardness to optimize production rates, ensure surface profile and reduce dust emissions.

c. Abrasive blast clean steel surfaces and appurtenances to a commercial grade (SSPC-SP6). Areas include piping in valve vault.
d. Abrasive blast clean ductile Iron pipe surfaces and appurtenances to NAPF 500-03-04.
e. Abrasive blast clean ductile Iron fittings surfaces and appurtenances to NAPF 500-03-05, blast clean #1.
f. Profile shall meet the requirements of the specified coating system.
    1) and appurtenances to remove sanding dust as applicable.

3. Wet Interior and Exterior Repair Surfaces – Spot Power Tool Clean (Manchester Tank):
    a. Spot prepare all abraded and damaged paint surfaces due to repairs to a power tool clean grade (SSPC-SP11).
        1) All loose paint shall be removed by feathering until it is tight to the underlying coat.
        2) The existing paint edge shall be feathered smooth to the prepared steel surface.
        3) Power tool cleaning:
            a) Desco Model RAS16 power sanders or equal.
            b) Needle guns, roto-peeners, orbital or belt sanders prohibited.
            c) Use only 3 M Brand “Clean and Strip Discs.”
            d) Grinding discs for metal removal prohibited.
    b. All new steel components shall be shop blasted to a near white grade and painted with applicable primer.

3.3 APPLICATION

A. General:
1. Apply coatings in accordance with this Article, SSPC-PA1, and the Manufacturer's recommendations. Refer to 2.2.B.1.b. for additional limitations on DFT.
2. Do not apply initial coating until moisture content of surface is within limitations recommended by coating system Manufacturer.
3. Determine moisture content by use of moisture meter approved by Engineer.
4. Mil Thickness:
    a. Apply coats in a uniform manner and within the mil thickness range indicated in coating system schedule.
    b. Maximum mil thickness: As recommended by the coating Manufacturer.
    c. Where the mil thickness is not specified, it shall be as recommended by the coating Manufacturer.
5. Sand and dust between each coat to remove defects visible from a distance of 5 feet.
6. Additional Coats:
    a. Apply successive coats within recoat recommendation of the Manufacturer.
    b. Schedule inspection so as not to interfere with recoat time.
7. Each coat shall be smooth, free of brush marks, streaks, laps or pile-up of paints and skipped or missed areas.
8. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
9. Except for contact surfaces, surfaces of fabricated assemblies that are inaccessible after erection shall receive field coats of paint before erection.
10. Protect wet paint against damage from dust or other detrimental foreign matter as much as is practical.
11. Remove grills, covers, and access panels from mechanical and electrical systems from location and paint separately.
12. Coat interior and exterior weld seam surfaces by the brush method when applying field prime coat.

B. Painting – Wet Interior Surfaces (North Campus Tank):
1. Apply to the rate and manner recommended by the Manufacturer, unless otherwise stated in these specifications. Apply each coat as follows:
    a. Apply to clean surface prepared as previously defined.
    b. Apply to the film thickness range as specified in Part 2-Products.
    c. Brush and roll all sharp edges, corners, bolts, welds, laps, flanges, etc., to eliminate skips, misses and holidays.
        1) Apply additional dry stripe coat (brush and roller applied) between the intermediate and final coats.
2. Remove all runs, drips, sags and overspray by approved methods prior to application of successive coats.
    a. If such defects result, remove and apply additional coat to the affected area.
3. Cover and protect all surfaces and appurtenances not intended for painting.
    a. Use canvas or plastic tarps.
    b. Protect bowl or floor during painting of roof or upper sidewall.

c. Prior to abrasive blast cleaning:
    1) Cover fill pipe.
    2) Cover overflow pipe.

4. Remove dust and spent abrasive from painted surface prior to application of successive coats.
    a. If directed by Engineer, pressure wash to remove dust and debris between coats and after application of the finish coat.
5. Apply NSF approved seam sealer to the interior roof:
    a. Apply to areas above the high-water line to include:
        1) Steel plate lap seams.
        2) Porous or rough welds.
        3) Unwelded appurtenances through the roof shell.
        4) Includes roof beams for elevated tanks only.
    b. Apply according to Manufacturer's recommendations.
        1) Clean all surfaces prior to application.
        2) Apply material by completely filling the joint.
            a) Do not exceed manufactures requirement for 1/2-inch total thickness (Sikaflex 1A).
            b) Use closed cell backer rod where appropriate.
        3) Keep nozzle in the sealant with steady flow to prevent air entrapment.
        4) Application temperatures: 40 to 100 degrees F.
        5) Allow for sufficient cure in accordance with Manufacturer's recommendations.

C. Painting – Dry Interior Surfaces (North Campus Tank):
1. Apply to the rate and manner recommended by the manufacturer, unless otherwise stated in these specifications. Apply each coat as follows:
    a. Apply to clean surface prepared as previously defined.
    b. Apply to the film thickness range as specified in Part 2-Products.
    c. Brush and roll all sharp edges, corners, bolts, welds, laps, flanges, etc., to eliminate skips, misses and holidays.
2. Areas include steel piping and appurtenances in the pit.
    a. Surface preparation previously defined.
3. Remove all runs, drips, sags and overspray by approved methods prior to application of successive coats.
    a. If such defects result, remove and apply additional coat to the affected area.
4. Cover and protect all surfaces and appurtenances not intended for painting.
    a. Use canvas or plastic tarps.
    b. Protect balconies and condensate floor during painting.
    c. Prior to abrasive blast cleaning, carefully remove fill pipe insulation.
        1) Properly dispose.
5. Reinstall new insulation and frost jacket after the coating has fully cured.
    a. Retape along both vertical and horizontal seams.
        1) Apply a minimum of two full wraps on the horizontal seams.
    b. Install new aluminum frost jacket.
        1) Overlap to shed water.
        2) Connect with self-tapping screws.
    c. Custom fit over flanges, valves and expansion joint.
6. Remove dust and spent abrasive from painted surface prior to application of successive coats.
    a. If directed by Engineer, pressure wash to remove dust and debris between coats and after application of the finish coat.

D. Painting – Wet Interior & Exterior Repair Surfaces (Manchester Tank):
1. Apply to the rate and manner recommended by the Manufacturer, unless otherwise stated in these specifications. Apply each coat as follows:
    a. Apply to clean surface prepared as previously defined.
    b. Apply to the film thickness range as specified in Part 2-Products.
    c. Brush and roll all sharp edges, corners, bolts, welds, laps, flanges, etc., to eliminate skips, misses and holidays.
2. Remove all runs, drips, sags and overspray by approved methods prior to application of successive coats.
    a. If such defects result, remove and apply additional coat to the affected area.
3. Cover and protect all surfaces and appurtenances not intended for painting.

3.4 FIELD QUALITY CONTROL

A. Inspection:
1. To facilitate painting and inspection, each coat of paint shall be of a different color or tint.
2. Finished metal surfaces shall be free of skips, voids or pinholes in any coat when tested with a low voltage detector.
3. Do not apply additional coats until completed coat has been inspected and acknowledged in writing by Engineer.
4. Only coats of paint acknowledged in writing will be considered in determining number of coats applied.

B. Final Touch-Up:
1. Repair surface damage with touch-up paint matching material used for original coating.
2. Rub out and polish repaired areas to match surrounding finish.
3. Finish repair shall be of the quality typically found within the auto body industry.

3.5 CLEANING

A. General:
1. Remove spilled, splashed, or spattered paint from surfaces not indicated to be painted.
2. Do not mar surface finish of item being cleaned.
3. Provide daily inspection and clean-up as required of surrounding area and properties adjacent to Site.
4. Prior to acceptance of the Work of this Section, thoroughly clean painted surfaces and related areas in accordance with Division 01 Section “Cleaning and Waste Management.”
5. Dispose of abrasive blast material.
6. The testing, handling, transportation and disposal of waste shall be completed in accordance with these specifications and federal, state and local rules and regulations.
    a. Sampling:
        1) In presence of Engineer, collect representative samples of spent materials generated, for waste determination.
        2) TCLP tested for ten metals.
        3) Use a certified independent laboratory that specializes in such.
        4) Pay for testing.
        5) Pay for additional tests the landfill or treatment facility requires.
    b. Disposal:
        1) Dispose all wastes generated by surface preparation, abrasive blasting or chemical stripping.
        2) Store waste on site in approved containers until test results are received and a generator number has been issued, if applicable.
        3) Pay for cost if the waste is determined non-hazardous or hazardous by TCLP testing.
    c. Transportation:
        1) Transport waste either to a nonhazardous landfill or to a licensed hazardous waste facility for treatment and landfilling dependent upon testing.
        2) Use a licensed hazardous waste hauler if applicable.
        3) Provide manifests for hauling, treatment and disposal if applicable.
        4) Provide handlers with appropriate protective clothing to include but not limited to:
            a) Tyvek full body protective suits.
            b) Gloves.
            c) Respirators.

3.6 PROTECTION

A. General:
1. Adequately protect other surfaces from paint and damage.
2. Repair damage as a result of inadequate or unsuitable protection.
3. Protect adjacent properties during construction.

B. Protective Materials: Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

C. Protected Items: Protect fill/drain pipe, overflow pipe, and other openings against spent abrasives, paint chips, or coatings.

D. Fire Hazards: Place cotton waste, cloths, and materials which may constitute a fire hazard in closed metal containers and remove daily from Site.

E. Electrical Plates and Hardware:
   1. Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations.
   2. Carefully store these items, clean, and replace upon completion of work in each area.
   3. Do not use solvent to clean hardware that may remove permanent lacquer finish.

END OF SECTION 09 97 13

SECTION 26 42 20 – CATHODIC PROTECTION SYSTEM FOR ELEVATED WATER STORAGE TANK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing, installation and testing of an automatic impressed current cathodic protection system for an elevated water storage tank.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. NACE - Standard RP 0388.
   2. AWWA - Standard D104.

1.4 DEFINITIONS

A. Abbreviations:
   1. NACE - National Association of Corrosion Engineers.
   2. AWWA - American Water Works Association.

1.5 SYSTEM DESCRIPTION

A. Cathodic protection system includes:
   1. Power unit.
   2. Anodes complete with lead wires.
   3. Conduit, cables, junction boxes and wires between the power unit and anodes.
   4. Supplementary equipment and materials in addition to that specified which is necessary to ensure safe and satisfactory operation of the equipment within the limits of the specifications.

1.6 DESIGN AND PERFORMANCE REQUIREMENTS

A. The system shall be designed by a corrosion specialist accredited by NACE with at least five consecutive years' experience in design and maintenance of cathodic protection for water storage tanks.

B. Chemical analysis of water including resistivity measured in ohm-cm.

C. Set the power unit/controller to maintain an electro-negative tank-to-water potential of at least 850 millivolts as measured against a copper-copper sulfate reference electrode with an accuracy of 25 millivolts. Measure the potential as recommended in NACE Standard RP O388.

D. Protect total surface area of bowl of tank assuming total bare surface area of 25% of total surface area.

E. Minimum current density of 0.5 MA/ft^2 bare surface area.

F. Potential measured free of IR drops.

G. 20-year minimum design anode life.

1.7 SUBMITTALS

A. Shop Drawings: For cathodic protection system.
   1. Name of Manufacturer.
   2. Model number.
   3. Details of construction and installation.
   4. Assembly drawings, including elevations, plans, sections, dimensions, weight, and conduit entry locations.
   5. Options and accessories.

B. Installation Instructions: For cathodic protection system.

C. Manufacturer’s Certification of Cathodic Protection System:
   1. Sworn statement that the equipment furnished complies with this Specification.
   2. Written approval of installation.

D. Operation and Maintenance Manuals: For cathodic protection system.
   1. Equipment function, normal operating characteristics, and limiting conditions.
   2. Assembly, installation, alignment, adjustment, and checking instructions.
   3. Operating instructions for start-up, routine and normal operating, regulation and control, shutdown, and emergency conditions.
   4. Maintenance instructions.
   5. Guide to "troubleshooting".
   6. Parts lists and predicted life of parts subject to wear.
   7. Project specific outline and cross-sections, assembly drawings, engineering data, and wiring diagrams.
   8. Test data and performance curves.

1.8 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.
   3. Minimum five years experience in similar projects.
   4. Work shall be supervised by person with NACE certification.

B. Manufacturer's Services:
   1. Submit Manufacturer's sworn statement that the equipment furnished complies with this Specification.
   2. Provide Manufacturer's Field Service. Provide list of three similar projects installed during the past 5 years.

C. Testing of Cathodic Protection System: In accordance with manufacturer’s recommendations.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated materials and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

1.10 SEQUENCING AND SCHEDULING

A. Install all mounting hardware prior to tank interior painting.

1.11 WARRANTY

A. Provide written warranties from cathodic protection Manufacturer which:
   1. Warrant for 1 year after final start-up that the equipment is free from defects in workmanship and materials.
   2. Warrant that the equipment supplied will control corrosion and pitting on the water contact area inside the steel tank described herein for a period of 5 years after the final start-up, provided the equipment is operated as specified by the Manufacturer without any interruption of more than seven days.

B. Inspect the system after installation once 12 months after project Substantial Completion date:
   1. Electrically test and physically inspect the cathodic protection system and equipment.
   2. Perform a series of electrical measurements inside the tank to determine the degree of corrosion control. Measure a minimum of 5 locations.
   3. Conduct measurements with a portable high impedance voltmeter and a calibrated copper-copper sulfate reference cell.
   4. Adjust operation of system, if necessary, to provide optimum corrosion control.
   5. Provide hard copy report of operating parameters, and recommendations prepared by NACE approved engineer.
   6. Conduct work in accordance with NACE Standard RP 0388.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Except as otherwise specified, materials shall be the products of the following Manufacturers, or approved equal:
   1. Cathodic Protection Services.
   2. Harco Waterworks CP.

2.2 MATERIALS

A. Power Unit:
   1. This specification outlines the minimum quality required for long-term economy and reliability of the cathodic protection power unit.
   2. The unit shall be 100% solid state, air-cooled and consisting of the necessary potential control circuitry, transformers, rectifiers, circuit breaker, meter, wiring, terminals, and appurtenances of adequate capacity to meet the requirements of the system. Where multiple D.C. output circuits are required, each circuit shall consist of separate transformers, rectifier, and control. The output of each circuit shall be electronically controlled in all modes of operation, no variable resistors or other mechanical devices shall be used. Transformer voltage tap adjusters shall not be used to control the operation of the power unit. The entire power unit shall be field serviceable.
   3. Designed to operate on 110 volts, 1 phase, 60 hertz, A.C., from -25 degrees C to +55 degrees C.
   4. With the following standard features:
      a. Automatic control of current output to maintain potential at preselected level.
      b. Accept all standard reference electrodes without internal wiring modification or replacement of components.
      c. Measure and display potential level in any operating mode continuously or on demand.
      d. Linear current limiting.
      e. Auto-restart after power outage.
      f. Short circuit, surge, and lightning protection (A.C. and D.C.).
      g. Automatic circuit check.
      h. Dead front panel, NEMA 4 enclosure.
      i. Clock circuit.
      j. Fingertip panel control, digital readout.
      k. Automatic overprotection control in all modes of operation.
      l. Automatic temperature compensating circuit.
      m. Illuminated panel display on hinged display panel.
      n. Complies with FCC regulation for digital devices.
      o. Convection cooling. No blowers or mechanical forced air cooling.

B. Transformer:
   1. Of the separate primary and secondary type, able to withstand continuous operation 10% above rated input voltage at the maximum rated D.C. output.
   2. Designed for a maximum hot spot heat rise not to exceed 50 degrees C.

C. Rectifiers:
   1. Silicon with adequate cooling surfaces so that their normal temperature rise at rated capacity will not exceed that specified by NEMA.
   2. Air-cooled and housed in the power unit cabinet.

D. Control Circuits:
   1. The control circuit of the power unit shall be designed to continuously monitor the potential of the structure and automatically regulate the protective current as required to maintain the potential at the preselected level.
   2. A microprocessor shall be used for overall system control and phase controlled SCR's for current regulation.
   3. The current output of the unit shall be controlled in all modes of operation to prevent overprotection.
   4. The control shall be preset and fixed and shall override all other operating parameters.
   5. The power unit shall be capable of operating as a constant current rectifier continuously delivering preselected current to the anodes. In this mode, the automatic control shall be locked out without affecting the preprogrammed settings. The output of the power unit shall be regulated from 0-100% of rated capacity in 20 or more equal steps without the use of transformer taps.
   6. The power unit shall also be capable of operating automatically and continuously monitor the potential of the structure and make necessary adjustments in the current output to maintain the structure potential at the preselected value. A single reference electrode placed within one to 2 centimeters from the protective structure shall be used to measure the potential and control the operation of the power unit.

E. Anodes:
   1. Sacrificial anode:
      a. Continuous wire.
      b. 0.062-inch minimum diameter.
      c. Metal oxide-coated titanium wire or equal material.
      d. Furnish separate anode for riser, if applicable.
   2. Metallurgically bonded platinum on niobium substrate, minimum diameter 0.062 inches with 25 micro inches of platinum.
   3. Design Life: 10 years, minimum.
   4. Maximum Corrosion Dissipation Rate: 30 milligrams per ampere year.
   5. Suspended horizontally from a 1/2-inch solid braid polyester rope tied to steel eye rings welded to the tank shell.
   6. Locate the horizontal anode system below the low water level point to reduce the possibility of winter ice damage.

F. Reference Electrodes:
   1. Copper-copper sulfate reference electrodes shall be used to measure the level of protection on the submerged steel surfaces.
   2. Construct the electrodes for extended usage (permanent type) and remain stable for a minimum of 10 years.
   3. Stability: ± 5 millivolts with 3.0 microamp load.

G. Pressure Entrance Fitting:
   1. 1.5-inch coupling rated at 3000 lb., minimum.
   2. Manufactured to prevent leakage or water migration through the insulated lead wires.

H. Hardware: Protected against corrosion.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in conformance with the Manufacturer's literature reviewed by Engineer and the Manufacturer's recommendations.

B. Mount power unit adjacent to electrical panel in a manner approved by Engineer.

3.2 WELDING

A. Complete by AWS certified welders experienced in the specific welding required.

B. Provide the certificates to the Engineer as a submittal prior to the Notice to Proceed.

C. Complete in accordance with AWWA D100, AWS or API, latest edition thereof.

D. All welds shall be full fillet or butt welds.

E. All joints created by the installation of brackets, clips, couplings, etc. shall be seal welded to prevent crevice corrosion.

F. Prior to welding, clean and prepare in accordance with AWS.

G. Grind welds smooth to remove slag, spatter and rough edges.

3.3 ELECTRICAL SERVICE

A. Electrical service is available at the Site.

B. Connect the rectifier and controller to the electrical service box using an available circuit as provided.

C. Provide trenching if necessary to connect electrical service to rectifier.
   1. Buried conduit shall conform to local electrical code requirements.
      a. Contact MISS DIG prior to trenching.

D. Eliminate or minimize duplicating or obsolete connections, if applicable.

3.4 ANODE CONFIGURATION

A. Configure in a horizontal position within the tank proper.

B. The position of the anode shall not interfere with internal appurtenances during fluctuating water levels and shall remain in an unobstructed position when the tank is removed from service.

C. Spheroid or spherical tanks with access tubes.
   1. Secure the anode by clips and tethers to the access tube.
      a. Incorporate a circular PVC ring to maintain the anodes position.
      b. Use buoys to float in position up to approximately 1/3 water level.

D. All wiring and lead connections shall be secured by taped or tied connections.

E. The wiring shall be protected against:
   1. Mechanical abrasions of fluctuating water levels.
   2. Around sharp corners.
   3. Through entrance couplings and fittings.

3.5 COATING REPAIR

A. All coatings damaged by the installation of the cathodic protection system shall be repaired. The existing coating systems are previously described.

B. All repair coating systems shall be provided with sufficient cure and recoat times per Manufacturer's recommendations including such additional time that may be necessary for low ambient or surface temperatures, high humidity or inadequate ventilation.

C. Painting shall be performed in conditions suitable for painting and as recommended by the Manufacturer.

D. No painting shall be allowed when the surface temperature is less than 5 degrees F above the dew point or when the relative humidity is greater than 85 percent.

E. All coating shall be applied by brush or roller.

3.6 FIELD QUALITY CONTROL

A. Manufacturer’s Field Service: Manufacturer's engineer to provide the services indicated below for a minimum onsite time of 1 day, or that time required to accomplish required tasks. Schedule the following as soon as practicable after installation and at times approved by Engineer and Owner.
   1. Manufacturer's engineer shall check work, assist in start-up, demonstrate operation and maintenance to Owner's personnel, and review operation and maintenance manual with Owner's personnel.

B. Promptly make all changes and additions required by Manufacturer's engineer.

C. Submit Manufacturer's engineer's written approval of installation.

D. Field Performance Test:
   1. To verify that the cathodic protection system is operating within the specified potential range, make an independent series of potential measurements with a copper-copper sulfate half cell as a test reference electrode and a 10 megohm or greater input impedance meter.
   2. When making the measurements, place the test cell midway between anodes within 2 centimeters of the submerged steel tank surface.
   3. Take measurements with protective current applied at intervals of approximately 3 feet.
   4. Adjust the system for optimum operation.

END OF SECTION 26 42 20

SECTION 31 23 03 – EXCAVATION AND FILL FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of the major items listed below:
   1. Excavation and trenching in earth and in rock.
   2. Disposal of items from clearing and unsuitable or excess excavated materials.
   3. Complete drainage of excavations.
   4. Temporary or permanent sheeting, bracing and shoring of excavations.
   5. Installation of normal and special foundations, bedding and backfill materials.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standard Specifications:
      a. D1556 - Density and Unit Weight of Soil In Place by the Sand-Cone Method.
      b. D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
      c. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
      d. D2922 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods.
   2. State DOT Current Standards:
      a. Specifications for Construction.
      b. Standard Plans.

1.4 DEFINITIONS

A. Terms:
   1. Bedding: The material placed around a utility between 4 inches below to 12 inches above the utility the full width of the trench.
   2. Driving Surface: A pavement, curb, or sidewalk.
   3. Excavation:
      a. Removing the following materials from their present location:
         1) Native below-grade material such as soil, rocks, boulders less than 1/2 cubic yard in volume, and buried trees.
         2) Man-made items such as, but not necessarily limited to:
            a) Bituminous and concrete paving.
            b) Curbs.
            c) Riprap.
            d) Head walls.
            e) Underground utilities.
            f) Manholes and catch basins.
            g) Foundations.
            h) Sidewalks.
   4. Extra Earth Excavation: Excavation of native material from below the normal trench bottom.
   5. Foundation Material: The material placed in a trench undercut to replace extra earth excavation.
   6. Hardpan:
      a. Cemented soil layers.
      b. Is not hard clay layers that are not cemented.
   7. Imported Material: Soil material which is purchased by Contractor and hauled onto the Site.
   8. Native Material: Soil and other natural earth materials, except rock, which are existing on the Site prior to the start of Work.

9. Normal Trench Bottom: The surface of the undisturbed native material at an elevation 4 inches below the bottom of the utility.
10. Pavement: Any combination of subbase, base course and concrete, bituminous or aggregate surface course, including shoulders, placed on a subgrade. Includes roadways, parking areas, driveways, and bituminous seal coat.
11. Rock Excavation:
    a. Excavation of igneous, metamorphic or sedimentary rock or hardpan which cannot be excavated without continuous drilling and blasting or continuous use of a ripper or other special equipment.
    b. Excavation of boulders of 1/2 cubic yard or more in volume.
12. Special Foundations:
    a. Specially constructed systems for support of underground utilities such as timber piling, concrete foundations and surcharge techniques.
    b. Extra earth excavation and placing imported or native materials are not special foundations.
13. Structure: A building, retaining wall, tank, footing, slab, or other similar construction.
14. Suitable Material:
    a. Native material excavated from the trench and approved as backfill by Engineer or independent testing laboratory.
    b. Not used under or within 1 on 1 slope of driving surfaces or structures.
    c. Placed between the top of the bedding or trench backfill as indicated on the Drawings and the bottom of the surface restoration.
15. Trench Backfill:
    a. The material placed between the top of bedding and the bottom of suitable material, the surface restoration or driving surface, as indicated on the Drawings.
    b. Used under and within 1 on 1 slope of driving surfaces or structures.
16. Utility Structure: Manhole, catch basin, valve chamber, junction chamber, water main valve, or other similar utility appurtenance.
17. Other Definitions: Other earthwork terms not defined herein or in the Contract Documents shall be as defined in state DOT Standard Specifications for Construction.

1.5 DESIGN AND PERFORMANCE REQUIREMENTS

A. Trench Bottom Suitability:
1. Be responsible for the suitability of the normal trench bottom in supporting the utility, bedding and backfill.
2. Notify Engineer and await Engineer's decision if a possible unsuitable condition exists.
3. Poor dewatering techniques or lack of excess water control shall not be a reason for additional payment for remedial measures.

B. Trench Wall Stability:
1. Be responsible for the trench configuration, including sheeting, shoring and bracing necessary to support trench side walls from collapsing.
2. Be responsible for the structural design and stability of a pipe-laying box if utilized on the Project to prevent trench walls from collapsing.

1.6 QUALITY ASSURANCE

A. Testing: Testing will be performed in accordance with Division 01 Section "Testing Services for Buried Utilities, Roadways, and Site Projects." and the Contractor’s Quality Control Plan.

B. Compaction:
1. Determine density by the modified Proctor method, ASTM D1557.
2. Compact granular trench backfill and bedding to at least 95% maximum density.
3. Compact suitable backfill material to at least 90% maximum density.
4. The first 12 inches of native material at the bottom of utility trenches:
    a. Test for density.
    b. Compact to at least 95% maximum density (modified proctor) if the existing density is below 95% maximum density (MP).
    c. Compact clay soil to at least 98% maximum density in accordance with standard proctor ASTM D698, if below 98% maximum density (SP).

1.7 SUBMITTALS

A. Action Submittals: For imported materials:
   1. Source.
   2. State DOT classification.
   3. Sieve Analysis.

1.8 PROJECT CONDITIONS

A. Dust Control:
   1. Use all legal means necessary to control dust on and near the Work and on and near off-site borrow areas if such dust is caused by Contractor's operations during performance of the Work or if resulting from the condition of the Site when earthwork operations are suspended.
   2. Moisten or otherwise treat haul roads, delivery roads, temporary site access roads and other surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the Site.
   3. Scrape, broom, or vacuum adjacent streets to remove tracked dirt every Friday afternoon, or more as necessary if directed by Engineer. Utilize vacuum if dust from brooming is excessive in opinion of Engineer.

B. Existing Structures, Utility Structures, and Utilities:
   1. Call MISS DIG to locate existing underground utilities prior to starting excavation. Contact City staff for the location of utilities on City property.
   2. Where utilities, utility structures or structures are encountered which are in active use:
      a. Provide adequate protection for them.
      b. Be responsible for damage to them.
   3. Provide stand-by utility service if temporary removal is necessary for a period exceeding 2 hours.
   4. Where utility service connections to occupied buildings must be temporarily disconnected, give 48 hours' notice to the affected occupants of the time and duration of the anticipated shutoff.
   5. Notify Fire Department 48 hours in advance if water main or fire supply line shutoff is required.
   6. Raise, lower, or move underground utilities, utility structures or structures which interfere with the utility or utility structure being constructed as part of this Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
   1. Approval Required: Material shall be subject to the approval of Engineer or independent testing laboratory.
   2. Notification: For approval of imported material, notify Engineer or independent testing laboratory at least 1 week in advance of intention to import material, designate the proposed borrow area, and permit Engineer or independent testing laboratory to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

B. Material Sources and Uses:
   1. Imported Material:
      a. Foundation material.
      b. Bedding.
      c. Pea stone.
      d. Trench backfill.
   2. Native material unless quantity is not sufficient; then shall be imported material: Suitable material.

C. Foundation Material for Crushed Stone: 1-1/2-inch maximum size.

D. Bedding:
   1. For Pipes Less Than 36 Inches:
      a. MDOT 902 Granular Material Class II modified to 100% passing a 1/2-inch sieve.
      b. MDOT 902 Coarse Aggregate 17A.

2. For Utility Structures:
   a. Sand gravel fill of such gradation that 100% will pass a 1/2-inch sieve and not more than 10% by weight is lost by washing, or
   b. MDOT 902 Granular Material Class II modified to 100% passing a 1/2-inch sieve.

E. Pea Stone: Clean stone with 100% passing a 3/8-inch sieve and 100% being retained on a No. 8 sieve.

F. Trench Backfill: MDOT 902 Granular Material Class II.

G. Suitable Material:
1. Native Material Which is Used as Backfill:
   a. Exclusive of gray or blue clay, peat, organic matter, or frozen lumps.
   b. Containing no rocks or lumps over 3 inches in greatest dimension.
   c. Having a moisture content such that material is capable of being compacted to 90% maximum density.
2. MDOT 902 Granular Material Class II if native material is not adequate in opinion of Engineer.

2.2 OTHER MATERIALS

A. Other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by Contractor subject to the approval of Engineer or independent testing laboratory.

PART 3 - EXECUTION

3.1 GENERAL

A. Excavating, Backfilling and Compacting:
1. For Utility Structures: In accordance with this Section.

B. Obstructions:
1. Remove and dispose of buried trees, rocks, boulders, driving surfaces, pipes and the like, as required for the performance of the Work.
2. Exercise care in excavating around catch basins, inlets and manholes.
3. Avoid removing or loosening castings.
4. Repair and replace damaged or displaced castings; remove dirt entering utility structures during the performance of the Work at no additional cost to Owner.

C. Cutting Paved Surfaces and Similar Improvements:
1. Cut pavement prior to excavating.
2. Cuts shall be a minimum of 1-foot wider than trench on each side. When the remaining width of paved surface is less than 4 feet, remove the entire paved surface.
3. Before removing pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks the width of the trench.
4. Concrete:
   a. Pavements: Saw cut if over 3 feet from expansion or construction joint, otherwise remove to joint.
   b. Sidewalks: Remove to joints.
   c. Curb and Gutter: Remove to joints.
5. Final Surface Course Bituminous: Saw cut joints unless otherwise approved by Engineer.
6. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.
7. Contractor may tunnel under curbs that are encountered. Replace curb disturbed by construction.
8. Dispose of materials removed.

3.2 EXCAVATION AND TRENCHING

A. General:
1. By open cut from surface unless designated otherwise.
2. Slope sides of trench adequately for protection of the Work and safety of workers.

B. Maximum Length of Open Trench: 200 feet.

C. Width:
   1. Minimum Clearance on Each Side of Utility:
      a. To 16 Inches Diameter: 8 inches.
      b. Greater Than 16 Inches Diameter: Pipe outside diameter times 1.25 plus 12 inches.
   2. Maximum Width of Trench at Top of Bedding:
      a. Up Through 30-Inch Diameter Utility: 16 inches plus utility diameter.
      b. Greater Than 30-Inch Diameter Utility: 24 inches plus utility diameter.
   3. Maximum Width of Trench at Ground Surface:
      a. Not outside of the property line or easement.
      b. As required for protection of the Work and safety of workers.
      c. Use sheeting, bracing and shoring if required.
   4. Provide sufficient space in the trench to permit the joint to be properly made.

D. Depth:
   1. Excavate to provide the elevations, grades, and depths of cover indicated on the Drawings and herein specified.
   2. The 4 inches of required bedding material below the utility may be omitted if:
      a. Approved by Engineer.
      b. Contractor arranges and pays for testing of the native material.
      c. The native material complies with MDOT 902 Granular Material Class II material, modified so that 100% passes a 1/2-inch sieve.
      d. The material is compacted as specified herein.
   3. Excavate to the normal trench bottom elevation with an accuracy of ± 0.10 feet.

E. Rock Excavation:
   1. Where rock excavation is encountered within the excavation, expose the surface of the rock sufficient to permit adequate measurements to be taken before the rock excavation is started.
   2. Notify Engineer prior to removal if rock is encountered.
   3. No utility shall be within 6 inches of rock.
   4. Blasting:
      a. Only with permission of Engineer and in accordance with laws and regulations applying thereto.
      b. Secure permit if required.
      c. Notify utility and public agencies.
      d. Explosives shall be used with extreme care by experienced workers only.
      e. Hours shall be fixed by Engineer.
      f. Contractor solely responsible for safety, damage and control of blasting operations.

F. Bedding:
   1. Place the bedding material up to 1/8 the height of the utility. Compact as herein specified.
   2. Accurately shape the bedding material to fit the pipe shape. Recess the bedding to relieve the pressure on the bell or other projecting utility joint.
   3. After laying out the utility, tamp additional bedding in place up to the midpoint of the utility. Use hand-operated compactors to achieve the required compaction.
   4. Place additional bedding up to 12 inches above the top of the utility. Use hand operated compactors to achieve required compaction.
   5. Place bedding in maximum lifts of 10 inches.
   6. No payment shall be made for aggregate or stone bedding when used for Contractor convenience.

G. Trench Backfill:
   1. Use backfill material as each Drawing detail indicates and as the material is defined herein.
   2. Place backfill in 12-inch lifts and compact as herein specified. Engineer will consider greater lifts if testing indicates that the required compaction is being achieved.

H. Utility Structures:
   1. Place and compact specified bedding below utility structures.
   2. Backfill around utility structures shall be of the same type backfill as that required for the trench in accordance with these Contract Documents.
   3. Place backfill in 12-inch lifts and compact as herein specified.

3.3 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. General: Contractor responsibility and expense.

B. Disposal Sites:
   1. Material not desired by Owner shall be disposed of in a location determined by Contractor.
   2. Disposal of materials shall not violate laws, rules, regulations and the like regarding the filling of flood plains, wetlands and other environmentally sensitive areas.
   3. Provide adequate controls to maintain disposal sites in a neat and safe condition by periodic leveling of material, and such other practices as are necessary.
   4. Provide soil erosion control measures necessary to prevent soil erosion and sedimentation of wetlands, rivers, ditches, or similar low lying areas.

3.4 EXCESS WATER CONTROL

A. Regulations and Permits: Comply with soil erosion control permit in accordance with Mich. P.A. 451, Part 91 of 1994, the Natural Resource and Environmental Protection Act, and all pertinent rules, laws, and regulations.

B. Unfavorable Weather:
   1. Do not place, spread or roll fill material during unfavorable weather conditions.
   2. Do not resume operations until moisture content and fill density are satisfactory to Engineer or independent testing laboratory.

C. Pumping and Drainage:
   1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of water from every source entering the excavations or other parts of the Work.
   2. Dewater by means which will ensure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil. Use wells, portable pumps, temporary underdrains, or other methods as necessary.
   3. Perform Pumping and Drainage:
      a. In such a manner to cause no damage to property or structures and without interference to the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors.
      b. In accordance with pertinent laws, rules, ordinances, and regulations.
   4. Do not overload or obstruct existing drainage facilities.

D. General:
   1. Keep excavations dry during construction.
   2. Remove water by use of wells, well points, portable pumps, bailing, drains, underdrains or other acceptable methods.
   3. Provide crushed stone or gravel as required to aid dewatering operations.
   4. Divert or temporarily reroute existing sewers and drainage of discharge lines to adequate and acceptable outlets during construction. Contractor responsible to ascertain availability of outlets.
   5. Divert surface water from entering excavations by construction and maintenance of channels or berms.
   6. Sediment traps and other soil erosion control measures shall prevent soil particles from entering any sewer, watercourse or similar conveyance.
   7. Protect utilities, utility structures, and structures, existing and new, from hydrostatic uplift.

3.5 SHEETING, SHORING AND BRACING EXCAVATIONS

A. General:
   1. Furnish, put in place and maintain sheeting, bracing and shoring as may be required to properly support the sides of excavations and to prevent movement of earth which could in any way injure the Work or adjacent property.
   2. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the Work and adjacent property.
   3. A pipe-laying box may be used in lieu of sheeting.

B. Sheeting:
   1. Do not install by jetting.
   2. Remove as backfilling proceeds, unless ordered left in place by Engineer. Use care to fill and compact voids created by removal, especially below mid-height of utility.
   3. Sheeting Left in Place:
      a. Requires written approval of Engineer.
      b. Cut off minimum of 2 feet below finished grade.

3.6 CLEANUP

A. Upon completion of the work of this Section, remove all excess excavated material, trash, and debris resulting from construction operations. Remove equipment and tools. Leave the Site in a neat and orderly condition acceptable to Engineer, and in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 31 23 03

SECTION 31 23 06 – EXCAVATION AND FILL FOR STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of the major items listed below:
   1. Excavation.
   2. Backfilling.
   3. Sheeting.
   4. Bracing.
   5. Shoring.
   6. Disposal of excavated materials.
   7. Excess water control.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standards:
      a. D698 - Laboratory Compaction Characteristics of Soil Using Standard Effort.
      b. D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
   2. MDOT:
      a. 2003 Standard Specifications for Construction.
      b. Standard Plans.

1.4 DEFINITIONS

A. Terms:
   1. Driving Surface: A pavement, curb, or sidewalk.
   2. Excavation:
      a. Removing the following materials from their present location:
         1) Native below-grade material such as soil, rocks, boulders less than 1/2 cubic yard in volume, and buried trees.
         2) Man-made items such as, but not necessarily limited to:
            a) Bituminous and concrete paving.
            b) Curbs.
            c) Riprap.
            d) Head walls.
            e) Underground utilities.
            f) Manholes and catch basins.
            g) Foundations.
            h) Sidewalks.
   3. Fill: Imported material which is placed in structure undercut.
   4. Hardpan:
      a. Cemented soil layers.
      b. Is not hard clay layers that are not cemented.
   5. Imported Material: Soil material which is purchased by Contractor and hauled onto the Site.
   6. Native Material: Soil and other natural earth materials, except rock, which are existing on the Site prior to the start of Work.
   7. Pavement: Any combination of subbase, base course and concrete, bituminous or aggregate surface course, including shoulders, placed on a subgrade. Includes roadways, parking areas, driveways, and bituminous seal coat.

8. Rock Excavation:
   a. Excavation of igneous, metamorphic or sedimentary rock or hardpan which cannot be excavated without continuous drilling or blasting or continuous use of a ripper or other special equipment.
   b. Excavation of boulders of 1/2 cubic yard or more in volume.
9. Structure: A building, retaining wall, tank, footing, slab, or other similar construction.
10. Structure Backfill: Soil or other material which is placed against walls or sides of structures.
11. Subbase: The layer of material placed on the subgrade as part of the pavement structure.
12. Subgrade:
   a. Below structures and below fill on the Site: The top elevation of the undisturbed native material after all top soil is stripped off and excavation is completed.
   b. Below driving surfaces: The bottom elevation of the subbase.
13. Undercut: Excavation of native material from below the bottom of footings, floors, structures and subbases.
14. Utility Structures: Manhole, catch basin, valve chamber, junction chamber, water main valve, or other similar utility appurtenance.
15. Other Definitions: Other earthwork terms not defined in the Contract Documents shall be as defined in MDOT Standard Specifications for Construction.

1.5 DESIGN AND PERFORMANCE REQUIREMENTS

A. Excavation Side Stability: Be responsible for the structural design of all sheet piling, underpinning, shoring and bracing to prevent sides of excavation from collapsing and causing damage to adjacent structures, pavements, and materials.

B. Quantities: Determine the required quantities of all earthwork materials and operations and use as the basis for the lump sum Bid.

1.6 QUALITY ASSURANCE

A. Perform special inspections in accordance with Division 01 Section “Special Inspections and Tests.”

B. Compaction:
1. Predominately Granular Soils:
   a. Density shall be determined by using the modified Proctor method, ASTM D1557.
   b. Compact fill and backfill to at least 95% maximum density.
   c. The first 12-inches of subgrade below all structures, fill and backfill on the Site:
      1) Shall be tested for density.
      2) Compact to at least 95% maximum density if the existing density is below 95%.
2. Predominately Cohesive Soils:
   a. Density shall be determined by using the standard Proctor method, ASTM D698.
   b. Compact fill and backfill to at least 98% maximum density.
   c. The first 12-inches of subgrade below all structures, fill, and backfill on the Site:
      1) Shall be tested for density.
      2) Compact to at least 98% maximum density if the existing density is below 98%.

1.7 PROJECT CONDITIONS

A. Dust Control:
1. Use all legal means necessary to control dust on and near the Work and on and near all off-site borrow areas if such dust is caused by Contractor's operations during performance of the Work or if resulting from the condition of the Site when earthwork operations are suspended.
2. Moisten or otherwise treat haul roads, delivery roads, temporary site access roads and other surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the Site.
3. Scrape, broom, or vacuum adjacent streets to remove tracked dirt every Friday afternoon, or more often as necessary if directed by Engineer.
4. Utilize vacuum if dust from brooming is excessive in opinion of Engineer.

B. Existing Structures, Utility Structures, and Utilities:
1. Call MISS DIG to locate existing underground utilities prior to starting excavation. Call City staff for the location of utilities on City property.

2. Where utilities, utility structures, or structures are encountered which are in active use:
   a. Provide adequate protection for them.
   b. Be responsible for damages to them.
3. Provide stand-by utility service if temporary removal is necessary for a period exceeding 2 hours.
4. Where utility service connections to occupied buildings must be temporarily disconnected, give 48 hours' notice to the affected occupants of the time and duration of the anticipated shutoff.
5. Notify Fire Department 48 hours in advance if water main or fire supply line shutoff is required.
6. Raise, lower, or move underground utilities, utility structures, or structures which interfere with the structure being constructed as part of this Work.

C. Special Backfilling Requirements:
1. Comply with the regulations of the MDOT, county road, and railroad company engineering departments with regard to filling, backfilling and compaction in their respective rights-of-way.
2. Obtain all necessary permits for filling off Site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. All material shall be subject to the approval of Engineer.
2. For approval of imported material, notify special inspector at least 1 week in advance of intention to import material, designate the proposed borrow area, and permit to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

B. Material Sources and Uses:
1. Native material unless quality and quantity is not sufficient; then shall be imported material:
   a. Sand layers below floor slabs.
   b. Fill in structure undercut.
   c. Structure backfill below driving surfaces.
   d. Structure backfill not below driving surfaces.

C. Granular Layer Below Floor Slabs:
   a. Native material meeting the requirements of MDOT 902, Granular Material Class II modified to 100% passing a 1/2-inch sieve.

D. Fill In Structure Undercut: Native material meeting the requirements of MDOT 902, Granular Material Class II.

E. Structure Backfill Below Driving Surfaces: Native material.

F. Structure Backfill Not Below Driving Surfaces: Native material.

D. Native Materials Used as Fill or Backfill:
1. Exclusive of peat, organic matter, or frozen lumps.
2. Containing no rocks or lumps over 3 inches in greatest dimension.
3. With moisture content between 0.5% below to 2.0% above optimum moisture content.
4. Obtain approval for using native material as fill from special inspector.

2.2 OTHER MATERIALS

A. All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by Contractor subject to the approval of Engineer.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavating, Backfilling, and Compacting:
1. For Structures: In accordance with this Section.
2. For Utility Structures: In accordance with Division 31 Section "Excavation and Fill for Utilities."

B. Bracing and Sheeting:
   1. Do not install by jetting.
   2. Furnish, put in place, and maintain sheeting, bracing, and shoring as may be required to properly support the sides of excavations and to prevent movement of earth which could in any way injure the Work or adjacent property.
   3. Exercise care in the removal of sheeting, shoring, bracing, and timbering to prevent collapse or caving of the excavation faces being supported and damage to the Work and adjacent property.
   4. Do not leave any sheeting or bracing in the excavation after completion of the Work, unless approved by Engineer.

C. Obstructions: Remove and dispose of buried trees, rocks, boulders, driving surfaces, pipes, and the like, as required for the performance of the Work.

D. Cutting Paved Surfaces and Similar Improvements:
   1. Cuts shall be a minimum of 1-foot wider than excavation on each side. When the remaining width of paved surface is less than 4 feet, remove the entire paved surface.
   2. Before removing pavement, mark the pavement neatly.
   3. Concrete:
      a. Pavements: Saw cut if over 3 feet from expansion or construction joint, otherwise remove to joint.
      b. Sidewalks: Remove to joints.
      c. Curb and Gutter: Remove to joints.
   4. Final Surface Course Bituminous: Saw cut joints unless otherwise approved by Engineer.
   5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.
   6. Contractor may tunnel under curbs that are encountered. Replace curb disturbed by construction.
   7. Dispose of materials removed.

E. Undercut:
   1. If suitable bearing for foundations is not encountered at the elevations indicated on the Drawings immediately notify Engineer.
   2. If soft material, which in the opinion of special inspector is not suitable, is encountered below a structure, Engineer may order the removal of this soft material and its replacement with specified material in order to make a suitable foundation for the construction of the structure.
   3. Undercutting made at the order of Engineer will be paid for on the basis of the actual quantity of material excavated. Do not proceed further until instructions are received and necessary measurements made for purposes of establishing additional volume of excavation.
   4. No extra payment will be made if removal is required as a result of poor dewatering techniques.
   5. Undercutting which is specifically indicated on the Drawings or herein specified, shall be included in the base Bid.
   6. Soil removed may be used as fill in areas not below driving surfaces, structures, or utility structures.
   7. Compact subgrade at bottom of undercut prior to placing fill.
   8. Place and compact specified fill in undercut.
   9. Lateral extent of undercut shall be a horizontal distance equal to the depth of undercut below structure.

F. Excavating:
   1. All excavation shall be by open cut from the surface except as herein specified or as indicated on the Drawings.
   2. All excavations for structures shall be made in such manner and to such depth and width as will give ample room for building the structures and for bracing, sheeting, and supporting the sides of the excavation, for pumping and draining groundwater and wastewater which may be encountered, and for the removal of all materials excavated.
   3. Excavate to the required cross section and elevation indicated in the Drawings. Subgrade shall not vary more than 0.1 feet above or below the established elevations.
   4. All depressions caused by excess excavation, traffic or rolling shall be filled with specified fill or approved fill and rerolled and compacted in place as specified herein.

G. Frost Protection: Protect bottoms of excavations from frost.

3.2 COMPACTION

A. Select compaction equipment to achieve the required compaction without damaging adjacent structures.
   1. Suggested Equipment Selections:
      a. If soil is predominantly granular, use pneumatic tired or vibratory drum rollers loaded to not less than 325 pounds per rated inch of tire width.
      b. For clay fills, compact each layer with sheepsfoot rollers. Rollers shall have staggered rows of feet projecting not less than 7 inches from drum and shall be loaded to produce at least 200 pounds per square inch of tamping area in contact with the ground.
      c. Compact around structures with hand-operated vibrating compactors for granular soils and Barco rammer type compactors for clay soils.

B. Moisture:
   1. Compact fill and backfill with the moisture content as specified.
   2. If material is too wet, provide and operate approved means to assist the drying until suitable for compaction.
   3. If material is too dry, provide and operate approved means to add moisture to the layers.

3.3 FILL

A. General:
   1. Do not place fill until the subgrade been examined by special inspector.
   2. Place fill in even layers not exceeding 10 inches in depth and thoroughly compact as herein specified.
   3. Do not place additional fill until compaction on a lift complies with specification requirements.
   4. If an analysis of the soil being placed shows a marked difference from 1 location to another, the fill being placed shall not be made up of a mixture of these materials.
   5. Handle each different type of material continuously so that field control of moisture and density may be based upon a known type of material.
   6. Do not place fill following a heavy rain without first making certain on isolated test areas that compaction can be obtained without damage to the already compacted fill.

3.4 STRUCTURE BACKFILL

A. General:
   1. Remove debris from excavations before backfilling.
   2. Protect waterproofing during filling operations.
   3. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.
   4. Do not backfill on only 1 side of vertically spanning walls unless walls are adequately shored or permanent construction is in place to furnish lateral support on both top and bottom of wall.
   5. Place backfill in layers not exceeding 10 inches in depth.
   6. Do not place backfill on frozen subgrade.

3.5 EXCESS WATER CONTROL

A. Regulations and Permits: Comply with soil erosion control permit in accordance with pertinent rules, laws, and regulations.

B. Unfavorable Weather:
   1. Do not place, spread, or roll material during unfavorable weather conditions.
   2. Do not resume operations until moisture content and density are satisfactory to special inspector.

C. Pumping and Drainage:
   1. Provide, maintain, and use at all times during construction adequate means and devices to promptly remove and dispose of water from every source entering the excavations or other parts of the Work.
   2. Dewater by means which will ensure dry excavations, preserve final lines and grades, and do not disturb or displace adjacent soil. Use wells, portable pumps, temporary underdrains or other methods as is necessary.

3. Perform Pumping and Drainage:
   a. In such a manner to cause no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, and the work of other contractors.
   b. In accordance with pertinent laws, rules, ordinances and regulations.
4. Do not overload or obstruct existing drainage facilities.
5. Provide berms or channels to prevent flooding of subgrade. Promptly remove water collected in depressions.

3.6 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. General:
   1. Remove and properly dispose of excavated material not needed to complete filling and backfilling.
   2. Dispose of excess excavated material at a location off the Site.
   3. Disposal of materials shall not violate laws, rules, regulations and the like regarding the filling of flood plains, wetlands and other environmentally sensitive areas.
   4. Provide adequate controls to maintain disposal sites in a neat and safe condition by periodic leveling of material and such other practices as are necessary.
   5. Provide soil erosion control measures necessary to prevent soil erosion and sedimentation of wetlands, rivers, ditches, or similar low lying areas.

3.7 CLEANUP

A. Upon completion of the work of this Section, remove excess excavated material, trash, and debris resulting from construction operations. Remove equipment and tools. Leave the Site in a neat and orderly condition acceptable to Engineer, and in conformance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 31 23 06

SECTION 31 58 00 – TEMPORARY EARTH RETENTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the design, furnishing, installation, and removal of a temporary earth retention system and associated items:
   1. Mandatory Locations:
      a. Engineer has reviewed the geotechnical reports, soil borings and locations of items on the Site and has determined that a temporary earth retention system is required for construction of the following major items:
         1) Protection of earth anchorage of guy supporting cellular tower.
      b. Design and provide the temporary earth retention system for the mandatory locations.
   2. Determination by Contractor:
      a. For locations which are not specified as mandatory temporary earth retention system locations.
      b. Determine the need for temporary earth retention systems.
      c. Design and provide the temporary earth retention systems.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. MDOT:
      a. Standard Specifications for Construction.
      b. Standard Plans.

1.4 SYSTEM DESCRIPTION

A. The descriptions included herein shall not relieve Contractor of design liability. Contractor shall be responsible to select and design a temporary earth retention system that meets the criteria specified herein.

B. System Design Criteria:
   1. Temporary Earth Retention System:
      a. Capable of safely carrying soil, construction surcharge and loads from the cellular tower anchor imposed on the retention system as determined by the Contractor.
      b. Permits construction as indicated.
      c. Will not damage existing underground utilities and adjacent structures.
      d. Steel and concrete components that do not interfere with final construction may be left in place at no extra cost to Owner.
      e. Wood components shall be removed from final installation.

1.5 DESIGN AND PERFORMANCE REQUIREMENTS

A. Perform the structural design of the temporary earth retention system and provide the material and labor as determined by the structural design, but no less than the minimum requirements specified herein.

B. Engineer may order additional bracing, strength, or depth for adequacy of the temporary earth retention system. These additions shall not be the cause for a claim for additional cost to the contract. Neither shall they relieve Contractor of responsibility for the sufficiency of the strength of the system.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Temporary earth retention system shall be installed by a Contractor who has been in the business for not less than 10 years and is qualified to design and install them.
   2. Fabrication and Installation Personnel:
      a. Trained and experienced in the fabrication and installation of the materials and equipment.
      b. Knowledgeable of the specific system used.
   3. Design Personnel:
      a. Registered professional engineer in the State of Michigan.
      b. With 10 years minimum experience in structural design of earth retention systems similar in complexity to this Project.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Supply the necessary materials, connections, and equipment as required to construct the temporary earth retention system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Depth: Install temporary earth retention system to a depth below the required excavation as required by the design.

B. Steel Components Remaining In Place: Should Contractor choose to allow steel components to remain in place, no additional price shall be added to the contract.

3.2 CLEANING

A. Prior to completion of the work of this Section, clean all affected areas in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 31 58 00

SECTION 33 90 10 – SITE PROCESS PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of site process piping systems.

B. Work Included: All buried site process piping and accessories as indicated on the Drawings and herein specified.

C. Work Not Included:
   1. The work not covered under this Section includes nonburied process piping.
   2. The work does not include natural gas piping, building waste, vent and drainage systems, and piping systems to support HVAC systems.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. AWWA Standards:
      a. C105 - Standard for Polyethylene Encasement for Ductile-iron Piping for Water and Other Liquids.
      b. C110 - Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In., for Water and Other Liquids.
      c. C115 - Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.
      d. C151 - Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
   2. MDOT:
      a. 2020 Standard Specifications for Construction.
      b. Standard Plans.

1.4 SUBMITTALS

A. Shop Drawings: For site process piping systems.
   1. Outline, cross-sections, assembly drawings, dimensions and engineering data.
   2. Inside lining and outside coating.
   3. Name of Manufacturer and model.
   4. Materials of construction.

B. Manufacturer’s Literature: Submit complete Manufacturer's installation instructions for all Products.

C. Submit Manufacturer's certification that products and materials comply with these Specifications.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter. damage by weather or elements, and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Ductile Iron Pipe (DIP):
   1. Pipe: AWWA C151.
   2. For Potable Water Service:
      a. Meet the requirements of ANSI/NSF Standard 61.
      b. The certification must be stamped on the exterior wall of the pipe.
   3. Joints:
      a. Mechanical Joint: AWWA C111 with ductile iron retainer glands.
      b. Push-On Joint: AWWA C111.
      c. Restrained Mechanical Joint:
         1) U.S. Pipe: MJ Gripper Gland.
         2) American: Lok-Fast.
         3) Ebaa Iron Sales, Inc.: Megalug retainer gland.
      d. Restrained Push-On Joint:
         1) U.S. Pipe: TR FLEX, TR FLEX GRIPPER ring.
         2) American: Flex-Ring, Lok-Ring.
         3) Clow: Super-Lock.
   4. Fittings:
      a. Ductile iron or cast iron, pressure rated for 150 psi minimum.
      b. Fittings:
         1) AWWA C110 or C153.
         2) Fittings not covered by AWWA C110 or C153:
            a) Laying Dimensions: ANSI B16.1 Class 125; Manufacturer's standard for fittings not covered by ANSI B16.1.
            b) Thickness Design and Pressure Rating: AWWA C110 or C153.
   5. Lining: AWWA C104, cement-mortar, standard thickness, pipe and fittings.
   6. Outside Coating: Asphaltic coating, pipe and fittings.
   7. Thickness Class: 52.
   8. Polyethylene Encasement: In accordance with AWWA C105.
   9. Gaskets: SBR.

B. Polyethylene Pipe:
   1. Manufacturers:
      a. Plexco, Inc., EHMW PE 3408.
      b. Phillips Driscopipe, Inc., Driscopipe 1000 or Driscopipe 8600.

C. Steel Pipe:
   1. ASTM A53, Grade A, Type E or S.
   2. Schedule 40 unless otherwise indicated on the Drawings.
   3. Black steel pipe and fittings except where galvanized steel pipe is indicated on the Drawings or herein specified, in which case pipe and fittings shall be galvanized.
   4. Fittings:
      a. Welded: Wrought steel, ANSI B16.9, B16.28.

2.2 MANHOLES AND CATCH BASINS

A. Precast Reinforced Concrete: ASTM C478:
   1. Base Section:
      a. Existing Pipes: Separate base slab.
      b. New Pipes: Base riser section with integral floor.
   2. Watertight Manholes: Provide four 5/8-inch threaded anchor bolts in cone section.
   3. Joint Gasket: Rubber gasket conforming to ASTM C443.
   4. Connection Between Manhole and Sewer: Resilient connector conforming to ASTM C923.

B. Steps:
   1. Tread:
      a. Width: 10 inches or greater.
      b. Depth: 5 inches.
      c. Rail Height: 1-inch.
      d. Scored tread.
   2. Materials of Construction:
      a. Plastic: Reinforced with a 3/8-inch diameter steel bar.

C. Castings:
   1. Manholes:
      a. Solid Covers: No vent holes.
      b. Standard: Neenah, R-1642; EJIW, 1045; or equal.
      c. Watertight: Neenah, R-1916-F; EJIW, 1045WT; or equal.
   2. Catch Basins: Flat grate: Neenah, R-2501; EJIW, 1045 with Type M2 grate; or equal.
   3. Mortar: ASTM C270, Type M.
   4. Brick:
      a. Concrete: ASTM C55, Type I, Grade N.
      b. Clay: ASTM C62, Grade SW.
   5. Grade Rings: ASTM C478.
   6. Concrete: Division 03 Section “Cast-In-Place Concrete”.

PART 3 - EXECUTION

3.1 LINE AND GRADE

A. Lay pipe to grades and elevations indicated on the Drawings.

3.2 INSTALLATION

A. General:
   1. Install items to be embedded before concrete is placed.
   2. Fasten embedded items securely to prevent movement when concrete is placed.
   3. Protect all materials before, during and after installation.
   4. Prevent entrance of foreign materials.
   5. Install pipe, fittings and appurtenances in strict accordance with Manufacturer's recommendations and as specified herein.

B. Placement of Pipe:
   1. Bearing: Support entire length of pipe barrel evenly with extra excavation at joints.
   2. Bell and Spigot: Clean and lubricate immediately prior to assembly.
   3. Push-On Joints: Pipe end shall be tapered by grinding or filing back at least 1/8-inch on a 30 degree bevel.

C. Ductile Iron Pipe:
   1. Install pipe and fittings and hydrants in accordance with AWWA C600 except as otherwise provided herein.
   2. Fittings, in addition to those indicated on the Drawings, shall be provided in crossing utilities which may be encountered upon opening the trench.

3. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut end for push-on joint shall be beveled 30 degrees by grinding or filing back at least 1/8-inch.
4. Push-On Joint Assembly:
    a. Pipe shall be laid with bell ends looking ahead.
    b. A gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated.
    c. The plain end of the pipe to be entered shall then be inserted in alignment with the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means.
    d. After joining the pipe, a metal feeler shall be used to make certain that the gasket is correctly located.
5. Mechanical Joint Assembly:
    a. Install in accordance with AWWA C111, Appendix A and the instructions of the manufacturer.
    b. Under no condition shall extension wrenches or pipe over handle or ordinary ratchet wrench be used to secure great leverage.

D. Steel Pipe:
1. Field welding shall be in accordance with the American Welding Society standards. The strength of the field weld developed to the strength of the pipe.
2. Exterior Coating: In accordance with Section “Painting”.

E. Manholes:
1. Base Section Placement: Full and even bearing.
2. Joints and Lift Holes: Mortared finish on inside of concrete block and precast concrete units.
3. Top of Casting Elevation:
    a. Gravel Areas: 6 inches below surface.
    b. Bituminous Base Course: At base course grade.
    c. Final Wearing Surface: At finished grade. Adjustment of castings from base course grade to finished grade is incidental.
    d. Ditches: 6 inches below ditch bottom or protruding not more than 6 inches above slope; as applicable.
    e. Other Areas: As directed by Engineer or Owner.
4. Eliminate visible leakage.

3.3 HANDLING PIPE AND FITTINGS

A. Take care in loading, transporting and unloading to prevent injury to the pipe or coatings. Pipe and fittings shall not be dropped.

B. All pipe and fittings shall be subjected to a careful inspection and hammer test just prior to being laid or installed. No piece shall be installed which is found to be defective.

C. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to Owner.

D. Repair damage to coatings as directed by Engineer or Owner.

3.4 CLEANING

A. Prior to acceptance of the work of this Section, thoroughly clean all installed materials and products and related areas in accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 33 90 10

SECTION 40 05 13 – PROCESS PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of process piping.

B. Work included under this Section:
   1. Non-buried process piping indicated on the Process Drawings.

C. Related Section includes Division 40 Section “Process Valves.”

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ANSI B 16.5 - Pipe Flanges and Flange Fittings.
   2. ANSI/ASME B 31.3 – Process Piping Guide.
   3. ANSI/ASME B1.20.1 – Pipe Threads, General Purpose
   4. ASTM Standards:
      a. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
      b. A105 - Standard Specification for Carbon Steel Forgings for Piping Applications
      c. D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
      d. D2467 - Socket Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
   5. NSF Standards:
      a. 14 - Plastic Piping Components and Related Materials.
      b. 61 - Drinking Water System Components.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Pipe:
   1. Design, fabricate and install according to the references and standards specified herein.
   2. The Drawings indicate general pipe layout only. Details of joints, couplings, tie rods, supports and make-up pieces are not necessarily indicated. Submit proposed details for these components for Engineer’s review.
   3. Provide makeup pipe spools, supports and suitable couplings so that piping may be easily separated for removing valves and inline flanged device.

B. Supports and Hangers:
   1. The detailed design, layout and spacing of process pipe supports shall be the responsibility of the Contractor. However, required locations of some supports may be indicated on the Drawings.
   2. Design to prevent pipe sway and movement.
   3. Adequate to prevent sagging of plastic pipe.
   4. Design process piping support systems to allow process valves and meters to be removed from the piping system without adding temporary pipe supports to the pipe upstream or downstream of the valve or meter.

1.5 SUBMITTALS

A. Itemized Listings:
   1. Equipment to be provided.
   2. Deviations from the requirements of this Section.

B. Shop Drawings: For equipment assemblies in this Section to include:
   1. Details of construction and installation, including taps, weld-on outlets, water collars, specials, and similar features.
   2. Pipe diameter, wall thickness, length, centerline elevations, and locations and dimensions of valves fittings, taps, and in-line equipment and instruments, and similar features.
   3. Location and centerline elevation of wall sleeves and wall pipes.
   4. Type and location of pipe couplings.
   5. Schedule of wall sleeves and pipes indicating proposed sizes, lengths, and connection details.
   6. Plan indicating preliminary testing schedule showing pipe sections to be tested, bulkheads, and drains.
   7. Schedule of coatings.

C. Product/Catalogue Data: For all products in this Section to include:
   1. Manufacturer.
   2. Manufacturer’s engineering and specification data.
   3. Dimensions, thicknesses, cross-sections, materials of construction.
   4. Coatings.

D. Installation Instructions:
   1. Submit complete Manufacturer’s installation instructions for all products.
   2. Submit pipe Manufacturer's recommended span lengths between hangers or supports for each pipe size and type.

E. Certifications: Submit Manufacturer's certification that products and materials conform to these Specifications.

1.6 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. General:
   1. In-Plant Process Piping 3-Inch and Larger:
      a. Ductile iron.
      b. Unless otherwise specified below or indicated on the Drawings.
   2. Provide taps at locations indicated on the Drawings.

B. Ductile Iron Pipe Systems:
   1. Ductile Iron Pipe: Conform to AWWA C 151, Class 53.
   2. Minimum Tests and Test Results of the Physical Characteristics of the Pipe:
      a. Tensile Test:
         1) ASTM E8.
         2) Minimum Tensile Strength: 60,000 psi.
         3) Minimum Yield Strength: 42,000 psi.
         4) Minimum Elongation: 10%.

b. Notched Charpy Impact Test:
   1) ASTM E23 with 0.500-inch specimen.
   2) Minimum 7 ft-lbs at 70 degrees F ± 10.
c. Hydrostatic Pressure Test: Test pipe at 500 psi for at least a 10-second duration.

3. Ductile Iron Pipe: Cement mortar lined according to AWWA C 104.
4. Pipe Joints: Pressure rated at least as great as the pipe or fittings of which it is a part.
5. Flanges:
   a. Conform to AWWA C 115.
   b. Flange bolts and Hardware: Galvanized or zinc-plated.
6. Flange Gaskets: US Pipe Tyton Flange Tyte bulb-style gaskets.
7. Fittings: Conform to AWWA C 110 with cement mortar lining as specified above.
8. Provide factory fabricated weld-on outlets meeting AWWA C111 and C115 where indicated on Drawings. Coat and line piping after welding.
9. Paint outside of pipe, fittings, flanges and couplings in accordance with Division 09 Section “Painting.”

C. Carbon Steel Pipe Systems:
1. Use: 24-inch filter effluent piping.
2. Steel Pipe 6-Inch Diameter and Larger:
   a. In accordance with AWWA C200.
   b. Spirally welded steel pipe will not be allowed.
3. Fabricate and hydrostatically test steel pipe in accordance with AWWA C200.
4. Fabricate steel pipe fittings in accordance with AWWA C208.
5. Forged Fittings: Conform to ASTM A234.
6. Drawings indicate flanges at fittings and forged fittings. Welded connections and forged or fabricated fittings are acceptable subject to the proper placement of pipe couplings (flanged, grooved type, or mechanical type) necessary for a proper installation:
   a. Mechanical Couplings: Dresser Style 38; or equal. Provide coupling middle ring at least 7 inches long, with a thickness at least as great as the pipeline of which it is a part. Harness joints in accordance with the Drawings, Specifications, and AWWA Design Manual M-11 for the maximum pressures of 75 psi.
   b. Steel Pipe Flanges:
      1) In accordance with AWWA C207.
      2) Class D standard steel ring flanges for other lines.
      3) Flange Gaskets: Full face, rubber, NSF listed for potable water service.
7. Steel Pipe: Lined with NSF Standard 61 liquid epoxy protective coatings in accordance with AWWA C210 and as specified in Division 09 Section “Painting.”
8. Minimum Steel Pipe Wall Thicknesses:
   a. 20-Inch Diameter and Larger Lines: 0.375-inch.
   b. Other Lines: 0.25-inch.
9. Paint outside of pipe, fittings and flanges in accordance with Division 09 Section “Painting.”

2.2 SUPPORTS AND HANGERS

A. General:
1. Design Layout and Spacing of the Pipe Supports: Responsibility of Contractor.
2. Furnish factory fabricated hangers and supports complete with necessary inserts, clamps, bolts, nuts, washers, and accessories.
3. On pipes 12-inch diameter and larger, generally use pipe stand type supports extending to the floor below. Coordinate proposed use of hangers from floors above the pipe with Engineer to ensure that the floors are capable of supporting pipe weight.

B. Manufacturers and Types:
1. Pipe Hangers: Clevis or split ring type with adjustable threaded hanger rods.
2. Hangers and Supports: Grinnell, Unistrut, Crane; or equal.

2.3 WALL PENETRATIONS

A. Sleeves:
1. Schedule 40 Type 304 steel pipe of suitable size for installation of casing seal.
2. Paint inside surface of wall sleeve in accordance with Division 09 Section “Painting.”

B. Seals:
   1. Modular mechanical type consisting of chemical resistant interlocking synthetic rubber links shaped to continuously fill the annular space between pipe and wall opening.
   2. Expanded by tightening stainless steel bolts, with a pressure plate under each bolt head.
   3. Providing a water-tight seal between passing pipe and sleeve.
   4. Provide mechanical retaining assemblies for the modular mechanical seals at the locations indicated on the Drawings.
   5. Seal materials shall be NSF listed for potable water service.
   6. Manufacturers and Types:
      a. Link Seal by Thunderline Corporation.
      b. Or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install process piping and accessories in conformance with:
      a. The Manufacturer's recommendations.
      b. The Shop Drawings as reviewed by Engineer.
   2. Install items to be embedded before concrete is placed.
   3. Fasten embedded items securely to prevent movement when concrete is placed.
   4. Install items plumb, square, true to lines, grades, elevations, and locations as indicated on the Drawings and herein specified.
   5. Do not install chemical piping within finished rooms, regardless of size.
   6. Valves, regardless of size and contents, shall be readily accessible. Chemical feed piping valves shall be accessible from operating floor.
   7. Do not install chemical feed piping over equipment.

B. Hangers and Supports:
   1. Install hangers and supports at less than maximum spacing as recommended by pipe Manufacturer.
   2. Adjust hangers and supports to bring pipe lines to proper elevations.
   3. Install inserts in concrete flush with the surface and capable of developing the full strength of the bolt.

C. Wall Sleeves:
   1. Embed in concrete.
   2. After pipes have been placed through wall sleeves, clean the space between the pipe and the wall sleeve.

3.2 PAINTING

A. Paint pipe, fittings, supports, hangers, sleeves and accessories in accordance with Division 09 Section “Painting.”

3.3 DISINFECTION

A. Disinfect new process piping in conformance with AWWA C 651.

B. After disinfection, flush new process piping until the chlorine residual in the new section of piping is equal to that of the adjoining system, or less than 2 mg/l.

C. Use adequate quantities of flushing water so that the chlorine residual of the combined flushing and disinfection water is similar to the water of the adjoining system and is suitable for disposal.

3.4 CLEANING

A. Thoroughly clean installed materials and Products and related areas:
   1. Prior to acceptance of the work of this Section.
   2. In accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 40 05 13

SECTION 40 05 23 – PROCESS VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of all valves and valve operators in the process piping system as indicated on the process Drawings and defined in Division 40 Section “Process Piping Systems.”

B. Related Section includes Division 40 Section “Process Piping Systems.”

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the valves and operators of this Section shall comply with the following as applicable:
   1. ASTM Specification: A536 - Ductile Iron Castings.
   2. ANSI/NSF Standards: Standard 61 – Drinking Water System Components.
   3. ANSI/ASME Standards: ANSI/ASME standard B1.20.1 – Pipe Threads, General Purpose
   4. AWWA Standards:
      a. C 111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron.
      b. C 500 - Metal-Seated Gate Valves for Water Supply Service.
      c. C 504 - Rubber-Seated Butterfly Valves.
      d. C 509 - Resilient-Seated Gate Valves for Water Supply Service.
      e. C 550 - Protective Epoxy Interior Coatings for Valves and Hydrants.

1.4 SUBMITTALS

A. Shop Drawings:
   1. For equipment assemblies in this Section to include:
      a. Manufacturer.
      b. Model.
      c. Details of construction.
      d. Dimensions, including actuator dimensions and clearances.
      e. Materials of construction.
      f. Listing of components.
      g. Project specific wiring diagrams.
      h. Coatings.
      i. Weight of assemblies.
      j. Certifications of compliance with AWWA/NSF 61.
   2. For each type of equipment installed to include:
      a. Itemized listings.
      b. Deviations from the requirements of this Section.

B. Product Data: For equipment in this Section to include:
   1. Manufacturer.
   2. Model.
   3. Materials of construction.
   4. Manufacturer’s engineering and specification data.
   5. Electrical specifications and requirements.
   6. Torque specifications for actuators.

C. Torque calculations for actuators.

D. Installation instructions for equipment in this Section.

E. Operation and Maintenance Manuals: For equipment in this Section to include:
   1. Copy of reviewed Shop drawings and product/catalog data.
   2. Equipment function, normal operating characteristics and limiting conditions.
   3. Assembly, installation, alignment, adjustment and checking instructions.
   4. Operating instructions for start-up, routine and normal operating, regulation and control, and shutdown and emergency conditions.
   5. Lubrication and maintenance instructions.
   6. Guide to “troubleshooting.”
   7. Parts lists and predicted life of parts subject to wear.
   8. Outline, cross-sections, assembly drawings, engineering data, and wiring diagrams.

F. Certifications/Affidavits:
   1. Submit Manufacturer’s certification that products and materials conform to these specifications.
   2. Submit an affidavit from the valve manufacturer which certifies that actuators used were furnished and installed by the valve manufacturer.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Submittals.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, and damage by weather or elements and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

D. Ship and handle valves in conformance with Section 18 of AWWA C 504.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND TYPES

A. Provide valves of the size and type as indicated on the Drawings and these Specifications.

B. All valves of each type shall be the Product of one Manufacturer.

2.2 MATERIALS AND FABRICATION

A. Butterfly Valves:
   1. Tight closing, rubber-seat type complying fully with the latest edition of AWWA C 504.
      a. 24-inch and larger: Class 75A.
   2. The flanged, face-to-face dimension for Classes 25, 75, and 150 valves shall be short body laying length as specified under AWWA C504, Table 1, unless otherwise noted.
   3. Valves generally shall be mounted with the shaft horizontal.
   4. Bubble tight at rated pressures in either direction for applications involving throttling service or valve operation after long periods of inactivity.
   5. Valve Body:
      a. Cast iron or ductile iron with flanged short body design of body thickness in accordance with AWWA C 504.
      b. Flange drilling in accordance with AWWA C 504.

6. Valve Disc:
   a. Rotate 90 degrees from the fully open position to the tight shut position.
   b. Constructed of cast iron or ductile iron with stainless steel, nickel-copper or nickel chrome seating edge.
   c. Disc and shaft connection made with stainless steel pins.
   d. Disc design and thickness in accordance with AWWA C 504.
7. Valve Shaft:
   a. Turned, ground and polished; constructed of stainless steel.
   b. Shaft diameter and connections in accordance with AWWA C 504.
8. Valve Seat:
   a. Natural or synthetic rubber compound suitable for potable water service, applied to either the valve body or disc.
   b. Full 360 degrees, retained in the valve body or disc without hardware of any kind in the flow stream.
9. Coating:
   a. Interior and exterior surfaces immersed in process tanks: Coat in accordance with AWWA C550 using an ANSI/NSF Standard 61 - Potable Water (NSF-pw) listed epoxy; Tnemec; or equal.
   b. Exterior Surfaces (non-immersed): Shop prime coat in accordance with Division 09 Section “Painting” for interior ferrous metals – non-immersed (epoxy system).
   c. Flange Faces: In accordance with AWWA C 504.
10. Testing: Conduct hydrostatic and leakage tests in accordance with AWWA C 504 Sections 12.2 and 12.3.
11. Manufacturers:
    a. DeZURIK, Inc.
    b. Henry Pratt Co.
    c. Crispin Valve.
    d. Or equal.
12. Valve Actuators:
    a. The type as indicated in the Valve Schedule.
    b. Designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering.
    c. In accordance with AWWA C 504.
    d. Installed, adjusted, tested, and certified by the valve manufacturer prior to shipping.
    e. Locking lever (for valves 3-inch and smaller).
    f. Handwheel:
       1) Position indicators.
       2) Factory-installed actuator to valve.
       3) Traveling nut type, 2-inch operating nuts.
       4) Self locking.
       5) Minimum Handwheel Diameter: 12 inches.
       6) Turn wheel counterclockwise to open valve.
       7) Direction to open valve indicated on handwheel.

B. Gate Valves (GV), 3 Inches in Diameter and Larger:
1. Valves: AWWA C 509 – Resilient-seated Gage Valves for Water Supply Service.
2. Opening Direction: Counterclockwise as viewed from the top.
3. Stem Seal: V-type packing, O-ring seals or pull-down packing.
4. Manually operated geared actuators: nonrising stem.
5. Floor box operators and 316 stainless steel extension rod as required for application. Provide 2-inch square nut in floor box. Provide 2 T-handled wrenches 4 feet long to Owner for operation.
6. Provide 2 (minimum) intermediate extension rod supports with bearings.
7. All components within process tanks suitable for submerged service in chlorinated water.
8. Test Pressure: 250 psig minimum.
9. Coating:
   a. Interior and Exterior Surfaces Immersed in Process Tanks: Coat in accordance with AWWA C 550 using an ANSI/NSF Standard 61 - Potable Water (NSF-pw) listed epoxy; Tnemec; or equal.
   b. Exterior Surfaces (non-immersed): Shop prime coat in accordance with Division 09 Section “Painting” for exterior ferrous metals - nonimmersed (epoxy system).
10. Manufacturers:
    a. DeZURIK, Inc.
    b. Crispin Valve.
    c. Or equal.

2.3 INSTALLATION

A. Install in conformance with:
   1. The Shop Drawings reviewed by Engineer.
   2. The Manufacturer's recommendations.

B. Check and adjust valves, operators and accessories for smooth operation.

C. Paint all valves and accessories in accordance with Division 09 Section “Painting.”

D. Labeling: Provide an engraved stainless steel tag securely fastened to each valve with the valve size, pressure rating, and tag number clearly indicated.

E. Provide valve actuator Manufacturer’s field service as required to start-up, adjust, participate in control loop tuning, and calibrate all valve equipment.

2.4 CLEANING

A. Thoroughly clean all installed materials and products and related areas:
   1. Prior to acceptance of the work of this Section.
   2. In accordance with Division 01 Section “Cleaning and Waste Management.”

2.5 PROCESS VALVE SCHEDULE

A. The valve schedule is provided as an aid to the Contractor. Verify all valve requirements and provide valves for a completely operable system. Provide temporary valves as needed.

AA WTP				
VALVE TAG	SIZE	TYPE	OPERATOR	NOTES
RIV0101	30	Butterfly	Handwheel	

AA WTP Reservoir				
VALVE TAG	SIZE	TYPE	OPERATOR	NOTES
FW6306	24	Butterfly	2” Nut	Vault 1
FW6313	24	Butterfly	2” Nut	Vault 2
FW6307	24	Butterfly	2” Nut	Vault 3
FW6314	24	Butterfly	2” Nut	Vault 3
FW6308	24	Butterfly	2” Nut	Vault 4
FW6315	24	Butterfly	2” Nut	Vault 4
FW6318	24	Butterfly	2” Nut	Vault 5
FW6305	24	Butterfly	Handwheel	Vault House
FW6316	24	Butterfly	Handwheel	Vault House
FW6317	24	Butterfly	Handwheel	Vault House

END OF SECTION 40 05 23

SECTION 40 48 00 – CARBON FIBER REINFORCED COMPOSITE REPAIR FOR PROCESS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Specification covers the application, manufacturing, and installation of a carbon fiber reinforced composite system for the exterior structural repair and rehabilitation of existing filtered water steel pipes.

1.3 RELATED DOCUMENTS

A. ASTM D 3039: Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials.

B. ASTM D 5379: Standard Test Method for Shear Properties of Composite Materials by V-Notched Beam Method.

C. ASTM D 790: Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Insulating Materials.

D. ASTM D 4541: Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.

E. ASME PCC-2:
   1. Article 4.1; Non-Metallic Composite Repair Systems for Piping & Pipework: High Risk Applications
   2. Article 4.2; Non-Metallic Composite Repair Systems for Piping & Pipework: Low Risk Applications.

F. ASTM E 831: Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis.

G. ASTM D 2583: Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor.

H. ASTM G8: Standard Test Method for Cathodic Disbonding of Pipeline Coatings.

I. ASTM D3165: Standard Test Method for Strength Properties of Adhesives in Shear by Tension Loading of Single-Lap-Joint Laminated Assemblies.

PART 2 - PRODUCTS

2.1 COMPOSITE MATERIAL

A. Definitions:
   1. Primer: 100% solids, high build epoxy primer designed for adhesion to a carbon steel substrate while allowing sag free application at high film builds.
   2. Wet-Out: 100% solids, epoxy resin designed to thoroughly wet-out the carbon fiber forming a composite matrix with very high tensile and flexural properties.
   3. Carbon Fiber: Strands of carbon fiber arranged in various unidirectional or bidirectional weaves providing high strength characteristics, excellent corrosion resistance and excellent fatigue properties.
   4. Composite System: System consisting of epoxy primer, epoxy wet-out and carbon fiber.

B. Specifications: The carbon fiber repair system shall provide, as a minimum, the physical and chemical properties listed below:

1. Primer:

Working Life @ 68 degrees F	15 minutes
Dry Time @ 68 degrees F	4 hours
% Vol Solids (ASTM 2369)	100
Shore D Hardness (ASTM D2240)	80
Flash Point	>200 degrees F

2. Wet-Out:

Working Life @ 68 degrees F	15 minutes
Dry Time @ 68 degrees F	4 hours
% Vol Solids (ASTM 2369)	100
Shore D Hardness (ASTM D2240)	85
Flash Point	>200 degrees F

3. Carbon Fiber:

	12k x 3k	3k x 3k
Warp raw material	12K Continuous Tow	3K Continuous Tow
Filling raw material	3K Continuous Tow	3K Continuous Tow
Weave Style	Plain	Plain
Fabric Areal Weight	300 gsm (approx.)	193 gsm (approx.)
Warp Ends/Inch	8.0 +/- 1.0	12.5 +/- 1.0
Pick/Inch	8.0 +/- 1.0	12.5 +/- 1.0
Nominal Thickness	0.02 inches	0.012 inches

4. Composite:

	300C12	200C6
Tensile Strength (psi) (Hoop Direction)	104,000	44,100
Tensile Modulus (psi)	8,260,000	4,440,000
% Elongation	1.27	1.04
Flexural Strength (psi)	77,300	54,100
Flexural Modulus (psi)	3,800,000	2,360,000
Maximum Operating Temp (degrees F)	250	250
Coefficient of Expansion	5.6×10^{-6}	

5. Adhesion
   a. Substrate: ASTM D4541 (psi).
   b. Cold Rolled Steel: >2,000.
   c. Hot Rolled Steel: >2,000.
6. Chemical Resistance:
   a. ASTM D543 (30-day immersion)
   b. Water: No effect.
7. Manufacturer:
   a. The carbon fiber reinforced composite system shall be manufactured and supplied by:
      1) HydraTech Engineered Products LLC: Hydrawrap Structural Composite System.
      2) Structural Technologies: V-Wrap FRP Composite System.
      3) Or Engineer approved equal.

2.2 SUBMITTALS AND DOCUMENTATION

A. The composite Manufacturer shall review the bidding documents and shall design composite repair system in accordance with applicable codes and specifications. The composite system supplier shall provide engineering data and calculations to verify recommended composite thickness to meet the requirements of the project.

B. The composite Manufacturer shall provide all test information, including independent test data, with regards to the carbon fiber system being recommended.

C. The composite Manufacturer shall submit engineering drawings detailing the repair method to assist the installation contractor with the installation of the carbon fiber repair method.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION AND SITE PREPARATION

A. Material Handling, Storage & Inspection:
1. All materials shall be properly stored. Water contamination, temperatures below 32 degrees F and above 100 degrees F should be avoided.
2. Fabric boxes should not be stored on end, be in contact with moisture or left open in direct sunlight.
3. Materials should be visually checked for damage or defects that may affect performance or installation.
4. Inspect and certify that all required materials are available, identified by lot numbers, correctly labeled and have not reached their shelf life or use expiration date.
5. All required installation tools and equipment are on-site and in good working condition.
6. All testing equipment requiring calibration are verified as properly calibrated, functional and available for use.

B. Site Preparation:
1. All work shall be performed in accordance with applicable OSHA standards and Owner specified safety regulations.
2. All debris, corrosion, and obstructions shall be removed from the pipe and disposed of in accordance with the requirements of the contract, and local codes and ordinances.

3.2 INSTALLATION

A. Safety:
1. All work shall be performed in accordance with applicable OSHA standards and Owner specified safety regulations.

B. Pre-Installation Inspection & Surface Preparation:
1. The surface preparation method is dependent on the substrate and component(s) which the FRP System will be applied to and the engineering parameters being sought (e.g., strength, abrasion resistance, etc.). Generally the surface should be accessible to facilitate wrapping, clean, dry and free of extremely low or high areas. Specific details and requirements may be given on the Manufacturer's recommendations for the work being performed. Any deficiencies shall be documented and reviewed by the Manufacturer prior to installation.
2. Remove all loose dirt, corrosion, scale, and other debris from application areas in accordance with the Manufacturer's Engineering & Installation Instructions at least 2 inches on each side of where fabric will be applied. Provide near white metal surfaces for adhesion of the primer to the substrate. Grinding and wire brushing are acceptable as long as a surface profile is present and generated dust is completely contained. Surface preparation is mandatory in the case of significant wall loss of the pipe.
3. See the Manufacturer's Engineering & Installation Instructions for recommended surface preparation. In general the following surface preparation will be recommended:
   a. Steel: NACE No.2*/SSPC-SP 10*.
4. Mark the locations on the prepared surface to clearly define the installation positions or locations.
5. All sharp edges and corners are rounded to a minimum 1/2-inch radius. This can also be accomplished by thickened epoxy resin build-up.
6. All high/low surface imperfections (including dirt, scale, and other debris) running axially through or part way through the installation surface must be removed.
7. Any joint gaps or deep imperfections must be properly filled with approved joint filler and rendered smooth.
8. Required repairs or patch work shall be completed and cured prior to application of primer or epoxy materials.
9. The locations of all lateral connections to the host pipe shall be noted and suitable preparation made to ensure the FRP connects into the lateral connections.

3.3 INSTALLATION

A. The Contractor shall furnish all tools, equipment, materials and supplies and shall perform all labor required to complete installation of the fiber reinforced polymer (FRP) renewal process in full conformity with the Contract Documents

B. The FRP System shall be installed by experienced and qualified personnel. Personnel shall use proper PPE.

C. Temperature and humidity controls will be established in accordance with Manufacturer's recommendations. Document these conditions and verify the comply with Manufacturer's recommendations.

D. All components shall be evenly and completely mixed at the proper ratios specified.

E. Surfaces shall be properly primed in accordance with the Manufacturer's instructions.

F. Applying a 30-50 mil thick layer of primer evenly over the prepared substrate is required.

G. The primer should fully cover the prepared areas with a smooth surface filling voids and other surface irregularities.

H. All manual fabric wet-out saturation work shall be monitored by Supervision and performed by Qualified Installation personnel.

I. The combination of fabric and epoxy materials shall be applied to a prepared surface using methods that provide a uniform surface across the width of the fabric. Comply with Manufacturer's requirements for overlaps.

J. Dry light-weight fabrics may be applied directly to wet primed surfaces and saturated in-situ using a paint roller, brush or trowel.

K. The finished exposed edges shall be covered by epoxy or trim cut for aesthetics.

L. Unilateral or multidirectional fibers shall be applied in accordance with the Manufacturer's recommendations. The sequence and details shall be documented on the Daily Installation Report.

M. The sequence and details of installation shall be documented.

N. Any excess materials, application tools and containers shall be removed from site by Contractor.

O. Batch numbers and/or lot numbers will be recorded each day for polymer liner materials that are used.

P. Application conditions shall be per the following:
   1. Minimum Application Temperature: 40 degrees F (4.4 degrees C).
   2. Maximum Relative Humidity: 85%.
   3. Substrate Temperature: 5 degrees F (3 degrees C) above dew point.
   4. Thinning: Do not thin.
   5. Cleaning Fluid:
      a. Paint Thinner; MEK, or equal.
      b. To aid application at low temperatures, both components should be warmed to 60 to 68 degrees F (15.5 to 20 degrees C) prior to mixing

3.4 POST-INSPECTION

A. Any defects in the FRP lining must be recorded and repaired by an approved method.

3.5 QUALITY ASSURANCE

A. Work shall be performed by a Contractor who has a proven record of performance for similar installations. Contractor shall submit resumes for superintendents, foremen, and other applicable lead personnel for field installation crews demonstrating competency and experience to perform the work scope as defined in this specification and all other applicable contract documents.

B. The Contractor shall be licensed by the FRP material Manufacturer.

C. Documents of qualification by the FRP Manufacturer certifying the fitness of their products for use in the lining system and conformance to the requirements of this specification and all other applicable contract requirements. Certification shall also provide the history of successful application of the product.

END OF SECTION 40 48 00

APPENDIX

ATTACHMENT B
GENERAL DECLARATIONS

City of Ann Arbor
Guy C. Larcom Municipal Building
Ann Arbor, Michigan 48107

Ladies and Gentlemen:

The undersigned, as Bidder, declares that this Bid is made in good faith, without fraud or collusion with any person or persons bidding on the same Contract; that this Bidder has carefully read and examined the bid documents, including City Nondiscrimination requirements and Declaration of Compliance Form, Living Wage requirements and Declaration of Compliance Form, Prevailing Wage requirements and Declaration of Compliance Form, Vendor Conflict of Interest Form, Notice of Pre-Bid Conference, General Information, Bid, Bid Forms, Contract, Bond Forms, General Conditions, Standard Specifications, Detailed Specifications, all Addenda, and the Plans (if applicable) and understands them. The Bidder declares that it conducted a full investigation at the site and of the work proposed and is fully informed as to the nature of the work and the conditions relating to the work's performance. The Bidder also declares that it has extensive experience in successfully completing projects similar to this one.

The Bidder acknowledges that it has not received or relied upon any representations or warrants of any nature whatsoever from the City of Ann Arbor, its agents or employees, and that this Bid is based solely upon the Bidder's own independent business judgment.

The undersigned proposes to perform all work shown on the plans or described in the bid documents, including any addenda issued, and to furnish all necessary machinery, tools, apparatus, and other means of construction to do all the work, furnish all the materials, and complete the work in strict accordance with all terms of the Contract of which this Bid is one part.

In accordance with these bid documents, and Addenda numbered _____, the undersigned, as Bidder, proposes to perform at the sites in and/or around Ann Arbor, Michigan, all the work included herein for the amounts set forth in the Bid Forms.

The Bidder declares that it has become fully familiar with the liquidated damage clauses for completion times and for compliance with City Code Chapter 112, understands and agrees that the liquidated damages are for the non-quantifiable aspects of non-compliance and do not cover actual damages that may be shown and agrees that if awarded the Contract, all liquidated damage clauses form part of the Contract.

The Bidder declares that it has become fully familiar with the provisions of Chapter 14, Section 1:320 (Prevailing wages) and Chapter 23 (Living Wage) of the Code of the City of Ann Arbor and that it understands and agrees to comply, to the extent applicable to employees providing services to the City under this Contract, with the wage and reporting requirements stated in the City Code provisions cited. Bidder certifies that the statements contained in the City Prevailing Wage and Living Wage Declaration of Compliance Forms are true and correct. Bidder further agrees that the cited provisions of Chapter 14 and Chapter 23 form a part of this Contract.

The Bidder declares that it has become familiar with the City Conflict of Interest Disclosure Form and certifies that the statement contained therein is true and correct.

The Bidder encloses a certified check or Bid Bond in the amount of 5% of the total of the Bid Price. The Bidder agrees both to contract for the work and to furnish the necessary Bonds and insurance documentation within 10 days after being notified of the acceptance of the Bid.

If this Bid is accepted by the City and the Bidder fails to contract and furnish the required Bonds and insurance documentation within 10 days after being notified of the acceptance of this Bid, then the Bidder shall be considered to have abandoned the Contract and the certified check or Bid Bond accompanying this Bid shall become due and payable to the City.

If the Bidder enters into the Contract in accordance with this Bid, or if this Bid is rejected, then the accompanying check or Bid Bond shall be returned to the Bidder.

In submitting this Bid, it is understood that the right is reserved by the City to accept any Bid, to reject any or all Bids, to waive irregularities and/or informalities in any Bid, and to make the award in any manner the City believes to be in its best interest.

SIGNED THIS _____ DAY OF _____, 202_.

_____	_____
Bidder's Name	Authorized Signature of Bidder
_____	_____
Official Address	(Print Name of Signer Above)
_____	_____
Telephone Number	Email Address for Award Notice

ATTACHMENT C
LEGAL STATUS OF BIDDER

(The bidder shall fill out the appropriate form and strike out the other three.)

Bidder declares that it is:

* A corporation organized and doing business under the laws of the State of _____, for whom _____, bearing the office title of_____, whose signature is affixed to this Bid, is authorized to execute contracts.

NOTE: If not incorporated in Michigan, please attach the corporation's Certificate of Authority

• A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

* A partnership, organized under the laws of the state of _____ and filed in the county of _____, whose members are (list all members and the street and mailing address of each) (attach separate sheet if necessary):

_____

_____

_____

_____

_____

* An individual, whose signature with address, is affixed to this Bid: __ _____
(initial here)

Authorized Official

_____ **Date** _____**,** 202_

(Print) Name _____ Title _____

Company:
_____

Address:
_____

Contact Phone ( ) _____ Fax ( ) _____

Email _____

ATTACHMENT D
PREVAILING WAGE DECLARATION OF COMPLIANCE

The "wage and employment requirements" of Section 1:320 of Chapter 14 of Title I of the Ann Arbor City Code mandates that the city not enter any contract, understanding or other arrangement for a public improvement for or on behalf of the city unless the contract provides that all craftsmen, mechanics and laborers employed directly on the site in connection with said improvements, including said employees of subcontractors, shall receive the prevailing wage for the corresponding classes of craftsmen, mechanics and laborers, as determined by statistics for the Ann Arbor area compiled by the United States Department of Labor. Where the contract and the Ann Arbor City Code are silent as to definitions of terms required in determining contract compliance with regard to prevailing wages, the definitions provided in the Davis-Bacon Act as amended (40 U.S.C. 278-a to 276-a-7) for the terms shall be used. Further, to the extent that any employees of the contractor providing services under this contract are not part of the class of craftsmen, mechanics and laborers who receive a prevailing wage in conformance with section 1:320 of Chapter 14 of Title I of the Code of the City of Ann Arbor, employees shall be paid a prescribed minimum level of compensation (i.e. Living Wage) for the time those employees perform work on the contract in conformance with section 1:815 of Chapter 23 of Title I of the Code of the City of Ann Arbor.

At the request of the city, any contractor or subcontractor shall provide satisfactory proof of compliance with this provision.

The Contractor agrees:

(a) To pay each of its employees whose wage level is required to comply with federal, state or local prevailing wage law, for work covered or funded by this contract with the City,

(b) To require each subcontractor performing work covered or funded by this contract with the City to pay each of its employees the applicable prescribed wage level under the conditions stated in subsection (a) or (b) above.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the wage and employment provisions of the Chapter 14 of the Ann Arbor City Code. The undersigned certifies that he/she has read and is familiar with the terms of Section 1:320 of Chapter 14 of the Ann Arbor City Code and by executing this Declaration of Compliance obligates his/her employer and any subcontractor employed by it to perform work on the contract to the wage and employment requirements stated herein. The undersigned further acknowledges and agrees that if it is found to be in violation of the wage and employment requirements of Section 1:320 of the Chapter 14 of the Ann Arbor City Code it shall has be deemed a material breach of the terms of the contract and grounds for termination of same by the City.

_____
Company Name

_____
Signature of Authorized Representative Date

_____
Print Name and Title

_____
Address, City, State, Zip

_____
Phone/Email address

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500

ATTACHMENT E
CITY OF ANN ARBOR
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [___] *No. of employees*__

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $14.82/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $16.52/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

Company Name	Street Address
Signature of Authorized Representative Date	City, State, Zip
Print Name and Title	Phone/Email address

Attachment F

CITY OF ANN ARBOR LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2022 - ENDING APRIL 29, 2023

$14.82 per hour

If the employer provides health care benefits*

$16.52 per hour

If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than $10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than $500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed $.50 an hour for an average work week; and the employer cost or contribution must equal no less than $1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

For Additional Information or to File a Complaint contact
Colin Spencer at 734/794-6500 or cspencer@a2gov.org

Revised 2/1/2022

ATTACHEMENT G

Vendor Conflict of Interest Disclosure Form

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee _____ ( ) Interest in vendor's company ( ) Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:		
Vendor Name	**Vendor Phone Number**	
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, procurement@a2gov.org

ATTACHMENT H

DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy, including but not limited to an acceptable affirmative action program if applicable.

(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

_____
Company Name

_____
Signature of Authorized Representative Date

_____
Print Name and Title

_____
Address, City, State, Zip

_____
Phone/Email Address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

ATTACHMENT I

CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below.
You can review the entire ordinance at www.a2gov.org/humanrights.

Intent: It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.

Discriminatory Employment Practices: No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.

Discriminatory Effects: No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.

Nondiscrimination by City Contractors: All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.

Complaint Procedure: If any individual believes there has been a violation of this chapter, he/she may file a complaint with the City's Human Rights Commission. The complaint must be filed within 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the allegedly discriminatory action. A complaint that is not filed within this timeframe cannot be considered by the Human Rights Commission. To file a complaint, first complete the complaint form, which is available at www.a2gov.org/humanrights. Then submit it to the Human Rights Commission by e-mail (hrc@a2gov.org), by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107), or in person (City Clerk's Office). For further information, please call the commission at 734-794-6141 or e-mail the commission at hrc@a2gov.org.

Private Actions For Damages or Injunctive Relief: To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.

THIS IS AN OFFICIAL GOVERNMENT NOTICE AND
MUST BE DISPLAYED WHERE EMPLOYEES CAN READILY SEE IT.

Michigan Department
Of Transportation
CP-347 (04/10)

MICHIGAN DEPARTMENT OF TRANSPORTATION

CERTIFIED PAYROLL

COMPLETION OF CERTIFIED PAYROLL FORM FULFILLS THE MINIMUM MDOT PREVAILING WAGE REQUIREMENTS

(1) NAME OF CONTRACTOR / SUBCONTRACTOR (CIRCLE ONE)	(2) ADDRESS		
(3) PAYROLL NO. (4) FOR WEEK ENDING	(5) PROJECT AND LOCATION		(6) CONTRACT ID

(a) EMPLOYEE INFORMATION	(b) WORK CLASSIFICATION	(c) Hour Type	(d) DAY AND DATE HOURS WORKED ON PROJECT							(e) TOTAL HOURS ON PROJECT	(f) PROJECT RATE OF PAY	(g) PROJECT RATE OF FRINGE PAY	(h) GROSS PROJECT EARNED / GROSS WEEKLY EARNED	(i) TOTAL WEEKLY HOURS WORKED ALL JOBS	(j) DEDUCTIONS FICA	FEDERAL	STATE		OTHER	TOTAL DEDUCT	(k) TOTAL WEEKLY WAGES PAID FOR ALL JOBS
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											

Date _____

I, _____ _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
(Contractor or Subcontractor)

_____; that during the payroll period commencing on the
(Building or Work)

_____ day of _____, _____, and ending the _____ day of _____, _____,
all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Start. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ – in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.